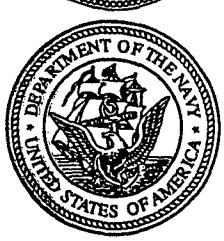
CALS TEST NETWORK

CTN Test Report 91-021

DIGITAL DATA ACCEPTANCE/ QUALITY ASSURANCE PROCEDURES



31 March 1992

Prepared for

Air Force Materiel Command

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CTN Test Report
91-021

31 March 1992

FINAL REPORT

DIGITAL DATA ACCEPTANCE/ QUALITY ASSURANCE PROCEDURES

FINAL

CONTRACT NO. DAAB07-89-D-A047
TASK ASSIGNMENT PLAN NO. 90-005

Prepared by Contractor for

DEPARTMENT OF THE ARMY COMPUTER-AIDED ACQUISITION AND LOGISTIC SUPPORT (CALS)
Ft Monmouth, NJ, 07703

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Army CALS Test Bed Contact
Alton K. Fairweather
(908) 532-0414

CTN Contact
Mel Lammers
(513) 257-3085

Prepared for
Air Force Materiel Command
CALS Test Network (AFMC/ENCT)
Wright-Patterson AFB, OH 45433-5000

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SECTION 1. INTRODUCTION

1.1 **Background**

The DOD Computer-aided Acquisition and Logistic Support (CALS) Test Network (CTN) is conducting tests of the military standard for the Automated Interchange of Technical Information, MIL-STD-1840A, and its companion suite of military specifications. The CTN is a DOD-sponsored confederation of voluntary participants from industry and government managed by the Air Force Logistics Command.

The primary objective of the CTN is to evaluate the effectiveness of the CALS standards (Standards) for technical data interchange and to demonstrate the technical capabilities and operational suitability of those Standards. Two general categories of tests are performed to evaluate the Standards, formal and informal. Formal tests are large, comprehensive tests that follow a written test plan, require specific authorization from DOD, and may take months to prepare, execute, and report.

Informal tests are quick and short, taking only a few hours to set up and execute. They are used by the CTN technical staff to broaden the testing base by including representative samples of the many systems and applications used by CTN participants. They also allow the CTN staff to gain feedback from many industry and government interpretations of the Standards, to increase the base of participation in the CALS initiative, and to respond, in a timely manner, to the many requests for help that come from participants. Participants take part voluntarily and are benefited by receiving an evaluation of their latest implementation (interpretation) of the Standards, interacting with the CTN technical staff, gaining experience in use of the Standards, and developing increased confidence in them. The results of informal tests are reported in Quick Short Test Reports (QSTRs) that briefly summarize the standard(s) tested, the hardware and software used, the nature of the test, and the results.

1.2 Purpose

This report involves two types of Department of Defense (DoD) engineering data repositories: The Army's Digital Storage and Retrieval Engineering Data System (DSREDS) and the Air Force's Engineering Data Computer-Assisted Retrieval System (EDCARS). The DSREDS/EDCARS data repositories store large volumes of engineering drawing data in digital format. The aperture card has been the common means for importing engineering drawing information to these systems; however the micrographics process and the handling of the cards during their generation, transport, inspection, and scanning is an error prone process. This process requires highly skilled operators and attention to detail in order to avoid degrading the quality of the data. The production of digital data from the initial Computer-Aided Design and Drafting (CADD) phase to the final, converted digital format phase involves less physical handling and thus reduces the chance of receiving degraded or poor quality digital data. Digital data media is therefore now the preferred means of importing engineering drawing data to DSREDS/EDCARS.

The basic engineering drawing information still requires the same final inspection as the aperture card film image and punched hollerith code, although the digital image data is now displayed on a high resolution monitor instead of an aperture card viewer. The micrographics inspectors and clerks are highly trained to view the images and conduct legibility and reproducibility inspections of the image, as well as format reviews. In some cases full document completeness reviews which are most often performed by engineering personnel, are also performed by the micrographics personnel within the engineering data section. The procedures recommended under this task effort may be used to distribute these final reviews between engineering, competitive advocacy, engineering data or other personnel since they can each work from the same DSREDS/EDCARS digital database.

The amount of inspection that is required is highly dependent on the quality of the digital data provided by the contractor. Therefore, the implementation of the procedures is, in many ways, dependent on the performance history of the contractor. The procedures recommended require that the contractor be qualified to produce data on digital data media and that they perform 100% quality assurance on each digital engineering drawing image. Included in these procedures are provisions for on-site government validation of contractor performance of 100% quality assurance and government representative statistical quality assurance sampling of the digital data. The procedures may be implemented at the discretion of the particular user as specified in the individual contract. For example, a new contract involving a large volume of digital data may dictate the implementation of on-site inspection while contracts with a contractor with a good performance record and/or lower volume of data may not require an on-site inspector.

The objective of this report is to present a set of recommended procedures that the government can use to perform quality assurance and data acceptance of digital data at the contractor site and at the DSREDS/EDCARS user site.

The final report consists of four sections. Section 1, the Introduction, provides background information, states the objective, and introduces the structure of this report. Section 2 describes the approach taken to develop the procedures and a flow of the data presented in procedure sequence. Section 3 provides a narrative overview of all of the recommended procedures. The final section, Conclusions and Recommendations, contains a summary of the major conclusions reached during the execution of the task and specific recommendations for the use and implementation of the procedures.

Appendix A of this report contains the Test Analysis Report. Appendix B is the Contractor Site Data Acceptance/Quality Assurance Procedures. Appendix C is the DSREDS/EDCARS Site Data Acceptance/Quality Assurance Procedures. The revision marks (vertical bars in the left margin) of the two site procedures documents reflect changes or additions made as the result of the site testing. The marked changes are documented in the Test Analysis Report.

SECTION 2. APPROACH

The revised procedures included in Appendix B were developed with inputs from two DSREDS sites, two EDCARS sites, and two contractor sites. The initial procedures were tested by conducting "walk-through" reviews with DSREDS/EDCARS Program Management and designated site and contractor personnel. Limited "live" testing was performed at one DSREDS site. The procedures were revised as a result of these reviews and included as an integral part of this final report. A Test Analysis Report, included in Appendix A, documents the results of the validation tests.

The approach taken in developing the procedures was based on the following guidelines:

- Digital Data will be directly imported into DSREDS/EDCARS.
- Quality digital data must be received from the Contractor.
- The implications of the CALS initiative regarding digital data will be considered.

The procedures address digital data delivered on magnetic tape media in order to discuss the CALS implications. Optical disk media is referenced for those procedures that are applicable to the import of large volumes of DSREDS/EDCARS data. Emphasis is placed on the contractor performing 100% quality assurance of each digital data image. Provisions for on-site government inspections and quality assurance of the delivered digital data are also included in the procedures. Summaries of the procedures are contained in Section 3: Digital Data Acceptance (DA) and Quality Assurance (QA) Procedures. Figure 1 provides a graphical representation of these procedures showing the time frame and a summary description of their purpose. Figure 1 provides the reader a condensed view of the recommended procedures and serves as an introduction to the summary descriptions contained in Section 3 and the detailed procedures included in Appendices B and C.

TIME FRAME:	PROCEDURE:	DESCRIPTION:
Prior to contract award.	DSREDS/EDCARS Procedure 1: Government Contract Preparation - Digital Engineering Drawing Data	Identifies the requirements for the procurement, review, and acceptance of digital data through the contract.
Defined prior to contract award. Applied during Contractor Procedure 4 and DSREDS/EDCARS Procedure 6.	DSREDS/EDCARS Procedure 2: Government Conduct Final Reviews - Engineering Drawing Package	Defines the final reviews that must be performed by the contractor during 100% quality assurance and by the government during visual validation at the DSREDS/EDCARS site.
During bidding, or shortly after contract award, the validation process is completed.	Contractor Procedure 1: Contractor Source System Validation	Validates contractor application of DSREDS/ EDCARS Digital Data Specification or , in the future, MIL-STD-1840A and MIL-R-28002. The government representative checks the appropriate documents.
During development, prior to storage of digital data on digital media.	and Data Preparation	Validates that the drawings are technically correct and conform to contract specifications prior to storage on transport media (as specified in the contract). The government representative checks the appropriate documents.
After digital data is written on digital media.	Contractor Procedure 2: Magnetic Tape Format Validation	Validates that the digital data conforms to DSREDS/EDCARS Digital Data format or, in the future, MIL-STD-1840A format. A format validation report is created.
After format has been validated.	Contractor Procedure 3: Creation of Document Identifier Report	Produces a Document Identifier Report. This report contains extracted key identification data needed for visual validation of image and key identification data.

Figure 1: Data Flow Diagram

TIME FRAME:	PROCEDURE:	DESCRIPTION:
After creation of Document Identifier Report.	Contractor Procedure 4: Visual Validation of Image, Key Identification Data, and Contract Specific Requirements	The government representative inspects the contractor marked Document Identifier Report to validate that 100% QA has been performed by the contractor.
After visual validation is completed and prior to government visual review.	Contractor Procedure 5: Preparing Data Acceptance Documents	Validates that the data acceptance documents are properly completed. These documents consist of a Data Acceptance Sheet and the Marked Document Identifier Report from Contractor Procedure 4.
After visual validation is completed and Data Acceptance Documents are prepared.	Contractor Procedure 6: Quality Assurance and Data Acceptance Performed by a Government Representative	The government representative inspects the images using statistical sampling procedures at a contractor furnished image workstation. He/she will judge the digital data acceptable or unacceptable (rejected) based on the acceptance criteria specified in the contract.
After government representative's approval	Contractor Procedure 7: Preparing Deliverable for Shipment	Verifies that the appropriate documents are enclosed and the digital data on the deliverable media is properly packaged.
Between contractor site and DSREDS/EDCARS site.	Shipment of Deliverable to DSREDS/EDCARS Site	
Upon receipt at DSREDS or EDCARS site.	DSREDS/EDCARS Procedure 3: Physical Acceptance of Deliverable	Validates that the deliverable media and documents are present and are in acceptable condition.

Figure 1: Data Flow Diagram (continued)

TIME FRAME:	PROCEDURE:	DESCRIPTION:
After completion of physical acceptance.	DSREDS/EDCARS Procedure 4: Conversion of Incoming 1840A/28002 Digital Data to DSREDS/ EDCARS Format	Converts 1840A/28002 digital data to DSREDS/EDCARS format. A conversion report is created. This report is compared with the Marked Document Identifier Report received from the contractor. (Note: This procedure only applies to data in 1840A/28002 format.)
After conversion (from 1840A to DSREDS/EDCARS) or after physical acceptance (DSREDS/ EDCARS format).	DSREDS/EDCARS Procedure 5: Population of DSREDS/EDCARS Databases	Transfers digital data from the deliverable media to the DSREDS/EDCARS system. A Database Population Report is created. This report is compared with the contractor-furnished Marked Document Identifier Report.
After database population report is completed.	DSREDS/EDCARS Procedure 6: Visual Validation of Image, Key Identification Data, and Contract Specific Requirements	The images are inspected on the DSREDS/EDCARS system. The implementation of this procedure provides for sample QA or 100% QA for initial loads or new contracts.
After completion of visual validation.	DSREDS/EDCARS Procedure 7: Final Acceptance	Based on the acceptance criteria specified in the contract, the digital data will be accepted or rejected.

Figure 1: Data Flow Diagram (continued)

SECTION 3: DIGITAL DATA ACCEPTANCE (DA) AND QUALITY ASSURANCE (QA) PROCEDURES

Engineering drawing data has traditionally been prepared and delivered to the government in hard copy and microform formats. Government digital image management and repository systems, such as DSREDS/EDCARS, can import hard copy and aperture card media but achieve greatest efficiency when digital data is imported directly. This direct importing of digital data will impact the preparation of the contract between the government and contractor. This impact includes the need to define the digital data requirements, the contractor method of data preparation, contractor quality assurance of the resultant digital data, and the government's technical reviews and QA/DA of the final engineering drawing digital data. The government quality assurance and data acceptance requirements for the digital data, in particular, are impacted if the final completeness, format, and legibility reviews are performed after importing to DSREDS/EDCARS. The procedures included in Appendices B and C have been updated as a result of review by the user site (DSREDS/EDCARS) personnel. This report provides general recommendations for governmental review and for future formal release of the procedures, in proper format, by the government. The procedures are summarized in this section in the sequence of implementation. Supporting justification is offered where appropriate.

DSREDS/EDCARS Procedure 1 - Government Contract Preparation - Digital Engineering Drawing Data identifies the requirements for the procurement, review and acceptance of digital data via the contract vehicle. The procedure defines the specifications, forms and DID documents required for procuring digital data.

The existing contracts for procuring engineering drawing data on aperture cards address microfilm production, inspection, and punched Hollerith code formats as well as the in-process and final reviews of the Engineering Drawing Package (EDP). Digital data procurement must address the electronic formats, transport media, contractor QA and digital acceptance criteria, as well as the in-process and final reviews of the EDP.

DSREDS/EDCARS Procedure 1 provides a description of the steps that could be followed in preparing the contract and supporting documents, while identifying the key issues that must be addressed in the contract. These issues include the type of data, contractor quality control of digital data, acceptance criteria at the contractor site and at the user site, transport media, penalties, incentives, and warranties.

DSREDS/EDCARS Procedure 2 - Government Conduct Final Reviews - Engineering Drawing Package (EDP) defines the Final Reviews that must be performed, the method of implementing the reviews and resources used presently to perform the reviews. The procedure addresses the implementation of these reviews for digital data that is imported to DSREDS/EDCARS. The procedure provides alternatives for performing the completeness, format, and legibility reviews. The procedure addresses the resources that can be used at DSREDS and EDCARS to perform the final reviews.

The existing procedures for the review and acceptance of the Engineering Drawing Package (EDP) apply to both aperture card data and digital data. However, implementation of the Final Reviews differs due to the different forms of transport media.

Contractor Procedure 1: Contractor Source System Validation and Data Preparation entails source system validation for the contractor, and also data preparation done by the contractor. This procedure determines that the contractor's source system has the capability to produce digital data (Level 3 Production data) on digital media, and that the preparation of the data will meet the requirements of the contract.

The existing procedure for the creation of aperture cards by the contractor includes a similar visual quality assurance process. The government has qualified the contractor by inspecting the contractor's quality control process and inspection procedures. Data is then prepared in accordance with contract requirements, and aperture cards are created from the data. The cards are visually inspected for quality. The contract specifies the extent of on-site inspection by qualified government personnel.

The recommended procedure validates that the contractor has a government approved digital system, quality control system, and inspection procedures that provide for the production of quality digital data. The procedure also validates that the contractor has produced digital data on the media specified by the contract, delivered it to a DSREDS/EDCARS or CALS specified site for testing for format and data content accuracy and that the data has been deemed acceptable at the testing site. The implementation of this procedure for media validation is required at the beginning of the contract. Subsequent quality control validation at the contractor site will be specified in the contract, or will occur if the quality control system is changed.

Contractor Procedure 2: Magnetic Tape Format Validation allows the government inspector to inspect a contractor report which verifies that the digital media format specified in the contract has been tested against government validation software for compliance. The contract will specify how often

the validation software will be run on the deliverable media (i.e., every 5, 10, or 15 deliverables).

The procedure specifically addresses magnetic tape as the media formatted in both CALS and DSREDS/EDCARS formats. DSREDS/EDCARS has procedures for formatting and importing optical disk media. These procedures will apply to a requirement for this media; however, MIL-STD-1840A does not address an optical disk format at this time.

The contractor will produce a report that verifies that the data has been properly written in either DSREDS/EDCARS or CALS format. If the tape documented in the report fails at this time, it is rejected. The benefit of this procedure, to both the contractor and government, is that the tape will be inspected early in the process, allowing the contractor ample time to recreate it if needed. It allows the government the opportunity to inspect the tape at its inception, and either provisionally accept or reject it.

This procedure is required to validate any specific production tape originated by the contractor. The validation of the tape format assures compatibility and transferability to the receiving site, in either CALS compliant (1840A/28002 format) or DSREDS/EDCARS format. It is important to do this immediately after any software changes at the contractor production site. Although precautionary in nature, this does not reduce the importance of this procedure. This software procedure assures that the tape is formatted correctly.

Contractor Procedure 3: Creation of Document Identifier Report discusses the creation of a Document Identifier Report. The contractor will be able to access the contractor's digital database and extract the key identification data in order to create a report. This report will be shipped with the deliverable media and is essential for the visual validation of the image identification data during the quality assurance process at the DSREDS/EDCARS site.

This report provides digital data information that is similar to that which is contained in the "Data Lists" provided with aperture cards. This report is used throughout the following nine contractor and DSREDS/EDCARS procedures.

Contractor Procedure 4: Visual Validation of Image, Key Identification Data, and Contract Specific Requirements concerns the visual validation of image, key identification data, and other contract specified final reviews of the drawing data. This procedure assumes that Procedures 1 through 3 have been performed successfully and that the contractor system hardware and software is operational. The contractor quality assurance operator has previously retrieved and displayed each image from the contractor digital database, and has performed 100% validation of each image area for completeness, format, legibility, and other contract specific requirements. This includes both image and identification data.

The aperture card validation procedure is currently performed at the government site. The primary difference between the digital data and aperture card procedure is that the responsibility for performing quality assurance of the digital data lies with the contractor, not the government. The government inspector simply validates from the Document Identifier Report that the contractor has performed 100% quality assurance on the data to be delivered.

The benefits to both the government and contractor, at this stage, are that the identification data and image data has been fully checked by the contractor and validated by a government inspector prior to shipment to the user site.

Contractor Procedure 5: Preparing Data Acceptance Documents assumes Procedures 1 through 4 are complete and the deliverable is prepared for review by the government representative. The government on-site representative will validate that the contractor has prepared a Marked Document Identifier Report, completed a Signed Data Acceptance Sheet, and prepared the digital media for processing.

The Data Acceptance Sheet and Marked Document Identifier Report are tangible evidence of 100% inspection of the digital data by the contractor. When signed by the government representative on site, they constitute data pre-acceptance by the Government. Its benefits are similar to those in Procedure 4, in that the pre-acceptance of data is performed closer to the source of the data (i.e., at the contractor site).

This procedure provides the type of control and audit trail functions essential to efficient data management. By preparing certain inventory control documents, such as the Data Acceptance Sheet, and providing a listing of tape contents, such as the Document Identifier Report, control of the deliverable is maximized.

Contractor Procedure 6: Quality Assurance and Data Acceptance Performed by Government Representative provides for government quality assurance and pre-acceptance of digital data at the contractor site. The contract will specify the extent of the implementation of the procedure and the resources to be provided by the contractor. The contract may allow for up to 100% quality assurance if the quality of data received is poor. Statistical sampling may be specified for large volume, high quality data. A third alternative is to not implement this procedure for low volume data deliveries. The qualified government inspector will perform full DoD format inspections, identification quality assurance, as well as legibility quality assurance of each image that is sampled. The acceptance/rejection criteria will be defined in the contract. The government representative will sign the data acceptance sheet furnished by the contractor if the data is determined to adhere to a certain level of quality (as specified in the contract and associated military standards).

The last contractor procedure, **Contractor Procedure 7: Preparing Deliverable for Shipment**, entails preparing the deliverable media for shipment. It involves packaging, protection, marking, encoding and shipping of the deliverable according to MIL-STD-1840A, specifically paragraph 5.3. Presently, with aperture cards, certain criteria are followed to ensure the safe delivery of the cards. The procedure for digital data delineates specific paragraphs and procedures to be followed to ensure safe delivery of digital media. The benefit to both the contractor and government is that the deliverable, once quality assured and accepted, can be determined to be, at the government site, the exact same tape in its exact same form, i.e., not damaged or compromised in any way. This procedure ensures that the government always receives the tape exactly as it was when it was prepared and accepted at the contractor site. Optical disk media is not discussed; however, the procedure for this media would require similar documents and packaging considerations.

DSREDS/EDCARS Procedure 3: Physical Acceptance of Magnetic Tape entails the receipt of a Contractor Deliverable Package, which consists of a Packing Slip, Marked Document Identifier Report, Data Acceptance Sheet and one or more Magnetic Tapes. The tapes contain image raster data and textual key identification data.

This procedure outlines the inspection of the package to verify the adherence to military standards, both in form and content, and the taking of inventory and visual inspection to verify that all components are correct.

Optical disk media is not discussed; however, the procedure for this media would require similar documents and packaging considerations.

DSREDS/EDCARS Procedure 4: Conversion of Incoming 1840A/28002 Digital Data to DSREDS/EDCARS Format is performed if the incoming deliverable tape is MIL-STD-1840A/28002 Format. DSREDS/EDCARS currently does not import this data format, relying instead on an internal format that is DSREDS/EDCARS specific. This is true for both data layout and raster content.

This procedure is provided for digital data on magnetic tape because only a magnetic tape data transfer standard is defined by CALS at this time.

The output of this procedure would be the DSREDS/EDCARS formatted tape and a report showing the successful conversion of each image. The Conversion Report may be compared with the contractor furnished Marked Document Identifier Report to verify the accuracy of conversion.

DSREDS/EDCARS Procedure 5: Population of DSREDS/EDCARS Databases entails inserting the contents of the magnetic tape into the DSREDS/EDCARS Information Management System (IMS [a product of IBM

Corp.]) databases where the data is stored on Direct Access Storage Devices (DASD).

The current process requires that the input be a DSREDS/EDCARS formatted magnetic tape. In these procedures, the original incoming tape may be in DSREDS/EDCARS format or in 1840A format. If in 1840A format, the tape must be converted as described in DSREDS/EDCARS Procedure 4.

This process consists of running system supplied software that reads the tape and writes the appropriate data to the appropriate fields in the databases. The image data is written to the Temporary Image File (TIF) database and the control data is stored in the DIR (Directory) database. The Database Population Procedure may be run under the additional control of Customer Information Control System (CICS [a product of IBM Corp.]), providing a higher degree of confidence in database integrity.

When the process is complete a Database Population Report is produced. This report indicates the success or failure of each insert operation. Each batch is assigned a unique date/time stamp which identifies it. The batch date/time stamps are listed on the Database Population Report. The contractor furnished Marked Document Identifier Report may now be compared with the Database Population Report to verify that the database has been populated correctly.

DSREDS/EDCARS Procedure 6: Visual Validation Of Image, Key Identification Data, and Contract Specific Requirements entails the process of visually inspecting the image data imported on magnetic tape after it has been imported to DSREDS/EDCARS. The existing procedures for performing this will be used. This visual quality assurance process is performed by system supplied software and runs as a CICS transaction.

The current procedure entails several steps. Once the data has been successfully inserted in the DSREDS/EDCARS system an operator selects a batch to view. The images are displayed on the appropriate image workstation.

The operator may pan, scroll, and zoom-in or zoom-out on the image, in order to inspect it for quality. The operator makes a judgement about the image quality, and enters their decision on the option bar; they may Accept, Suspend, or Reject any image. When a 'batch' is completed, the operator makes a decision on the disposition of the entire batch; again this is Accept, Suspend, or Reject. Only images marked Accept or Not-QA'd within a batch marked Accept will be eligible to be transcribed to optical storage disks.

Final acceptance of the contractor furnished digital data will be made in accordance with the acceptance criteria defined in the contract. The flexibility of DSREDS/EDCARS allows for a number of designated engineering data, engineering, or competitive advocacy personnel to access the data and conduct

final reviews. These reviews may be of data completeness (Top-Down-Break-Down [TDBD]), format, special contract requirements, and legibility/reproducibility.

DSREDS/EDCARS Procedure 7: Final Acceptance details the activities to be performed after the quality assurance process has been completed. The decision is made whether the magnetic tape is acceptable or is to be rejected. If acceptable, the DD250, Final Acceptance Sheet, and Acceptance Letter are prepared. If rejected, a Rejection Letter is prepared and the tape is returned to the Contractor for replacement. Individual images may be rejected and returned to the contractor even when the batch containing that image has been accepted.

SECTION 4. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations should be reviewed within the DSREDS/EDCARS community. The procedures referenced herein have been validated as being useful in the pre-CALS environment and will support the users in the transition to CALS-compliancy.

These conclusions and recommendations are supported by the gathering of on-site information from personnel with many years of practical experience in data repository operations. Their collective knowledge in image-based systems has helped the task team understand the current operating procedures and the needs of the user as digital data becomes the preferred method of interchange.

The following sections address conclusions and recommendations based upon the execution of this task and the combined experience of the task team members. The order of presentation is by relative importance as far as possible.

CONCLUSIONS

- Data Acceptance and Quality Assurance should be performed primarily at the source of the data (contractor site). This is both appropriate and practical. The promise of 100% quality data will only be realized through contractor and government commitment to a workable set of procedures that improve Total Quality Management (TQM).

- The data procurement process needs to be upgraded to include digital data requirements that are understandable by the contractor and enforceable by the government.

- Historically, data has not been maintained at the agreed levels of quality. The reasons are many; however, poor quality causes delay which results in increased operating costs. The approach to a solution is cooperative problem-solving as reflected in initiatives such as CALS.

- The spirit of cooperation between government and industry, based in part on mutual needs, is at a high point as we move into the nineties. An awareness that information is a product and a business asset has strengthened the case for the acquisition of quality digital data.

- Government-owned data repositories should benefit by the application of uniform digital data acceptance and quality assurance procedures.

- Technology provides opportunities to exploit a distributed methodology for accessing digital data. Ideally, government and industry would interact during the development of the data via remote image workstations and reduce the "batch" approach to the delivery of data.

- With certain contractors it may be possible to do some of the data checking remotely, providing flexibility in assignments. Finally, it is possible that engineering data personnel might be used in a "train the trainer" program with AFPRO/ARPRO and DCAS to help develop a field capability for quality assurance, format, and completeness checking.

RECOMMENDATIONS

- In addition to the emphasis placed upon proper contract structure and language within the recommended procedures, it is recommended that a "penalty and reward" strategy be applied in contracting for digital data. The purpose of the strategy is to encourage the contractor to establish and maintain a system that will consistently produce high quality digital data. Specific contract clauses should be developed to simplify the "penalty and reward" accounting procedure and the reporting system that identifies the problem. A system of management escalation (referring problems to a senior authority) should be incorporated where a quality problem persists.

- The extent of the contractor on-site statistical quality assurance sampling and the extent of the final acceptance quality assurance performed at the DSREDS/EDCARS site by government personnel are dependent on many factors, such as, contractor history of performance, new contract or contractor, volume of data, contractor resources, location, etc. It is recommended that each contract require the contractor to perform 100% quality assurance of the digital data and provide for on-site quality assurance by the government. Individual contracts should also define the criteria for data acceptance at the contractor site and at the DSREDS/EDCARS site.

- Having a trained government representative perform certification checks and quality sampling at the contractor site is essential to insure the receipt of quality digital data. It is recommended that engineering data personnel be included in the contractor site representative program. The engineering data personnel have the high experience levels needed to inspect and insure that the contractor is performing adequately and to recognize error trends at an early stage.

- Since DSREDS/EDCARS formatted media will be specified in the contract at certain sites, it is recommended that the necessary tools for validation of the media format and content be made available, or a validation facility be designated. This capability would be similar to CALS tools for checking the format of a magnetic tape that should be compliant with the 1840A specification.

TEST ANALYSIS REPORT

**DIGITAL DATA ACCEPTANCE/
QUALITY ASSURANCE PROCEDURES**

CONTRACT NO. DAAB07-89-D-A047
TASK ASSIGNMENT PLAN NO. 90-005

Prepared For:

DEPARTMENT OF THE ARMY COMPUTER-AIDED
ACQUISITION AND LOGISTIC SUPPORT (CALS)

30 March 1990

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless designated by other documentation.

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1. INTRODUCTION

1.1 Purpose of the Test Analysis Report

The Test Analysis Report for Task Assignment 90-005 is written to fulfill the following objectives:

a. To document the results of the Test Plan execution.

b. To establish end-user understanding of the operation of the recommended Contractor and DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures.

c. To provide for corrective action for deficiencies encountered.

1.2 Organization of the Test Analysis Report

The Test Analysis Report is divided into three major sections: Section 1 states the purpose of this report, refers to documents relevant to this report, and identifies the test participants; Section 2 analyzes the test results obtained during implementation of the Test Plan; and Section 3 summarizes the capabilities and deficiencies of the Contractor and DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures and provides a list of refinements that are to be incorporated into the procedures. The revised procedures are included as appendices to the Final Report for this task.

1.3 Project References

The following documents contain information applicable to this Test Analysis Report:

a. Contractor Site - Digital Data Acceptance/Quality Assurance Procedures: 9 February 1990

b. DSREDS/EDCARS Site - Digital Data Acceptance/Quality Assurance Procedures: 9 February 1990

c. Test Plan - Digital Data Acceptance/Quality Assurance Procedures: 23 February 1990

1.4 Test Participants

The procedures were evaluated by conducting "Walk-through" reviews at the following sites:

SITE	DATE
GE Aircraft Engines, Evandale, OH	6 March 1990
General Dynamics, Fort Worth, TX	9 March 1990
MICOM, Huntsville, AL	15 February 1990
McClellan AFB, Sacramento, CA	26 February 1990
AVSCOM, St. Louis, MO	28 February 1990
Tinker AFB, Oklahoma City, OK	8 March 1990

2. TEST ANALYSIS

The tests described in the Test Plan (see Section 1.3 (c) of this report) were conducted at the contractor and DSREDS/EDCARS sites listed in Section 1.4, Test Participants. The results of those tests, along with discussions and analyses, are presented in the paragraphs that follow. The results, discussions, and analyses are presented on a procedure-by-procedure basis.

2.1 Tests of Contractor Site Procedures

General Electric Aircraft Engines in Evandale, OH, and General Dynamics in Fort Worth, TX, were visited for the purpose of validating the seven contractor digital data acceptance/quality assurance procedures.

2.1.1 Test of Contractor Site Procedure 1: Contractor Source System Validation and Preparation

The purpose of this test was to validate that Procedure 1 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for validating the contractor's source system and ability to perform data preparation.

2.1.1.1 Results: Test of Contractor Site Procedure 1

This test was conducted in a walk-though fashion because the necessary documents are not currently in use. The following comments were made:

a. Procedure 1 was considered redundant and it was thought that this procedure should be executed at the beginning of the contract. When changes are made to system software, recertification by the government would take place through government quality assurance procedures.

b. The agency that would conduct DSREDS/EDCARS source system validation was not specifically identified.

c. Level 1 and 2 engineering drawings were not addressed in this procedure.

d. "Digital data" rather than "magnetic tape" should be used throughout the document because the focus of the task is on digital data.

2.1.1.2 Discussion and Analysis: Test of Contractor Site Procedure 1

In response to comment (a), the source system validation process is required under MIL-R-28002 for raster graphics digital data. Contractors who wish to rely on previous validation must furnish evidence that prior Government approval is appropriate for the current contract. The Government reserves the right to waive the requirement for validation to those contractors who have been previously validated. In addition, the contractor's government certified quality control system must be recertified when changes to that system occur. These points will be included in the revised Contractor Site Digital Data Acceptance/Quality Assurance Procedures.

In response to comment (b), the contract shall provide specific instructions regarding arrangements for examinations, approval of validation test results and disposition of raster graphic files. This will probably be done by personnel from a DSREDS/EDCARS site.

In response to comment (c), the revised Contractor Site Digital Data Acceptance/Quality Assurance Procedures will address the handling of level 1 and 2 engineering drawings.

In response to comment (d), the Contractor and DSREDS/EDCARS Site Digital Data Acceptance/Quality Procedures will be revised to focus upon digital data rather than the magnetic tape specifically.

2.1.2 Test of Contractor Site Procedure 2 : Magnetic Tape Format Validation

The purpose of this test is to validate that Procedure 2 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for validating that the contractor can produce magnetic tape in the format specified in the contract.

2.1.2.1 Results: Test of Contractor Site Procedure 2

This test was conducted in a walk-through fashion because the required software is not currently in use. The following comments were made:

a. The tape should be sent to the CALS Test Network Office or to a DSREDS/EDCARS site for validation.

b. Tape validation software need not be run against every tape because the contractor will have been validated previously.

2.1.2.2 Discussion and Analysis: Test of Contractor Site Procedure 2

In response to comment (a), the tape should be validated as close to the source as possible. This will permit a quick turn-around in the event that deficiencies in the tape or system are found. The intent of this procedure is to assure the compatibility and transferability of digital data between contractor and DSREDS/EDCARS sites before the tape is shipped.

In response to comment (b), the Contractor Site Digital Data Acceptance/Quality Assurance Procedures will be revised to state that the Government reserves the right to waive the execution of Procedure 2 if the contractor's previous deliveries have been acceptable and the source system has not changed.

Procedure 2 should be revised to reflect a focus on digital data.

2.1.3 Test of Contractor Site Procedure 3: Production of Document Identifier Report

The purpose of this test was to validate that Procedure 3 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for the creation of Document Identifier Reports.

2.1.3.1 Results: Test of Contractor Site Procedure 3

This test was conducted in a walk-through fashion because live data was not available and the necessary software is not currently in use. The following comment was made: The procedure should state that the contractor will produce a Document Identifier Report that accurately represents the contents of the tape.

2.1.3.2 Discussion and Analysis: Test of Contractor Site Procedure 3

The comment stated above adds clarity to the document and will be incorporated into the revised Contractor Site Digital Data Acceptance/Quality Assurance Procedures.

2.1.4 Test of Contractor Site Procedure 4: Visual Validation of Image and Key Identification Data

The purpose of this test is to validate that Procedure 4 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for performing visual validation of image and key identification data.

2.1.4.1 Results: Test of Contractor Site Procedure 4

This test was conducted in a walk-through fashion because live data was not available. The following comments were made:

a. The contractors were willing to perform 100% QA during the scanning of source aperture cards but not of the magnetic tape because the time, effort, and cost to the contractor were considered prohibitive.

b. There were doubts about being able to consistently verify "Image Number."

c. The term "FSCM" should be changed to "CAGE".

d. The use of "Sheet Number" as a key field was questioned.

e. Items other than the key fields may have to be verified.

2.1.4.2 Discussion and Analysis: Test of Contractor Site Procedure 4

In response to comment (a), the performance of 100% QA during scanning is fine for ensuring that the digital data is acceptable prior to storage on magnetic tape. The quality assurance function addressed by Procedure 4 is the condition of the digital data that is written to magnetic tape. The procedures will be revised to require that 100% quality assurance has been performed on the digital database which is then recorded on the deliverable media.

In response to comment (b), the "image number" is the same as "card number" or "frame number." The Contractor Site Digital Data Acceptance/Quality Assurance Procedures will be revised to include "card number" or "frame number" in parenthesis.

In response to comment (c), FSCM will be changed to "CAGE (FSCM)."

In response to comment (d), the Sheet Number is a key field but it may not appear on the display at all sites. The Contractor Site Digital Data Acceptance/Quality Assurance Procedures will be revised to note this possibility, as well as include references to format and completeness reviews by the contractor.

In response to comment (e), the contract may specify other items that must be present in the image or included in the key fields. The Contractor Site Digital Data Acceptance/Quality Assurance Procedures will be revised to note this fact.

2.1.5 Test of Contractor Site Procedure 5: Preparing Data Acceptance Documents

The purpose of this test was to validate that Procedure 5 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for preparing data acceptance documents.

2.1.5.1 Results: Test of Contractor Site Procedure 5

This test was conducted in a walk-through fashion because the necessary documents are not currently in use. There were no comments about this procedure.

2.1.5.2 Discussion and Analysis: Test of Contractor Site Procedure 5

No changes need to be made to this procedure as a result of testing.

2.1.6 Test of Contractor Site Procedure 6: Quality Assurance and Data Acceptance Performed by Government Representative

The purpose of this test is to validate that Procedure 6 of the Contractor Site Digital Data/Quality Assurance Procedures is adequate for use by a government representative for performing quality assurance and data acceptance.

2.1.6.1 Results: Test of Contractor Site Procedure 6

This test was conducted in a walk-through fashion because live data was not available. The following comments were made:

a. The question was raised as to whether the government representative was expected to operate the contractor furnished workstation alone or whether the contractor would have to supply an operator.

b. A "partial return strategy" was suggested. This would entail replacing rejected images rather than the entire batch.

c. Items other than image quality and key field identification may have to be inspected.

2.1.6.2 Discussion and Analysis: Test of Contractor Site Procedure 6

In response to comment (a), the resources the government representative will need to conduct Procedure 6 will be specified in the contract.

In response to comment (b), the acceptance criteria will be specified in the contract and the acceptance or rejection will be of a batch nature if the criteria are not met. Individual rejected images will be returned to the contractor even though the batch has been accepted.

In response to comment (c), the contract will specify what other items will be inspected during this procedure including format, completeness, and contract specific requirements. The Contractor Site Digital Data Acceptance/Quality Assurance Procedures will be revised accordingly.

2.1.7 Test of Contractor Site Procedure 7: Preparing Deliverable For Shipment

The purpose of this test is to validate that Procedure 7 of the Contractor Site Digital Data Acceptance/Quality Assurance Procedures is adequate for preparing the deliverable for shipment.

2.1.7.1 Results: Test of Contractor Site Procedure 7

This test was conducted in a walk-through fashion. There were no comments about this procedure.

2.1.7.2 Discussion and Analysis: Test of Contractor Site Procedure 7

No changes need to be made to this procedure as a result of testing.

2.2 Tests of DSREDS/EDCARS Site Procedures

MICOM in Huntsville, AL, McClellan Air Force Base in Sacramento, CA, Tinker AFB in Oklahoma City, OK, and AVSCOM in St. Louis, MO, were visited for the purposes of validating the five DSREDS/EDCARS site digital data acceptance/quality assurance procedures. The results of these tests along with discussions and analyses are presented in the following paragraphs.

2.2.1 Test of DSREDS/EDCARS Site Procedure 1: Physical Acceptance of Magnetic Tape(s)

The purpose of this test was to validate that Procedure 1 of the DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures was adequate for performing physical acceptance of magnetic tape.

2.2.1.1 Results: Test of DSREDS/EDCARS Site Procedure 1

This test was conducted in a walk-though fashion because the forms identified in the procedure are not currently in use. The following comments were made:

a. The involvement of DSREDS/EDCARS in the contract specification development and technical reviews and audits should have been included in these procedures.

b. "Contractors" should be added to the Data Acceptance Sheet and Document Identifier Report.

c. The Packing Slip and Data Acceptance Sheet Forms should be merged into one form.

d. "Contract Number" should be added to each form by the contractor.

e. The contractor's Data Acceptance Sheet should have the following additions:
   - A "Shipment _____ of _____" line
   - A "Contractor POC _____" line
   - A "Contractor Telephone Number _____" line
   - An "Acceptance _____ Rejection _____ of Package" line

2.2.1.2 Discussion and Analysis: Test of DSREDS/EDCARS Site Procedure 1

In response to comment (a), two new procedures should be created to meet those needs. The new procedures will address the role DSREDS/EDCARS

plays in contract preparation, and in technical reviews and audits. They will be added to the revised DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures.

The changes suggested in comments (b), (d), and (e) would improve the effectiveness of the procedures and will be implemented.

In response to comment (c), the Packing Slip and Data Acceptance Sheet should remain two separate entities. The function of the Packing Slip is to list the contents of the package while the Data Acceptance Sheet serves to document that the contractor has performed 100% quality assurance on the data and that the government representative has performed QA sampling at the contractor site. The Packing Slip will be revised where redundancy occurs.

2.2.2 Test of DSREDS/EDCARS Site Procedure 2: Conversion of Incoming 1840A/28002 Tape to DSREDS/EDCARS Format

The purpose of this test was to validate that Procedure 2 of the DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures is adequate for converting incoming 1840A/28002 formatted tape to DSREDS/EDCARS format.

2.2.2.1 Results: Test of DSREDS/EDCARS Site Procedure 2

This test was conducted in a walk-though fashion because methods for converting an 1840A/28002 compliant tape to DSREDS/EDCARS format tape are not currently in place. The following change was suggested: Paragraph 4.2 (c) should read "If any failure occurs, consult the site termination procedure."

2.2.2.2 Discussion and Analysis: Test of DSREDS/EDCARS Site Procedure 2

The change cited above should be implemented. Once the method of conversion is established, no other changes to this procedure are anticipated.

2.2.3 Test of DSREDS/EDCARS Site Procedure 3: Population of DSREDS/EDCARS Databases

The purpose of this test is to validate that Procedure 3 of the DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures is adequate for populating DSREDS/EDCARS databases.

2.2.3.1 Results: Test of DSREDS/EDCARS Site Procedure 3

This test was conducted in a walk-though fashion because the large amount of time needed to populate the DSREDS/EDCARS databases was prohibitive. Because the Database Population Routine is currently and frequently used, there were no problems encountered in executing this step. The following changes were suggested:

a. Paragraph 4.3 (a) should have the following sentence appended: "The output of this routine is the Database Population Report."

b. Paragraph 4.3 (b) reference a comparison of the Database Population Report with the contractor-delivered Document Identifier Report.

c. Paragraph 4.3 (c) should read "If any failure occurs, consult the site termination procedure."

2.2.3.2 Discussion and Analysis: Test of DSREDS/EDCARS Site Procedure 3

The changes listed above should be implemented. These changes would add clarity to the procedure.

2.2.4 Test of DSREDS/EDCARS Site Procedure 4: Visual Validation of Image and Key Identification Data

The purpose of this test is to validate that Procedure 4 of the DSREDS/EDCARS Site Procedures is adequate for visually validating image and key identification data.

2.2.4.1 Results: Test of DSREDS/EDCARS Site Procedure 4

This test was conducted using live data at the AVSCOM DSREDS site. Because this is the procedure currently used at the DSREDS/EDCARS sites, there were no problems executing this procedure. It was suggested that the word "emphasize" be replaced by "recommend" in the last sentence second paragraph of section 4.4.

2.2.4.2 Discussion and Analysis: Test of DSREDS/EDCARS Site Procedure 4

The change cited above should be implemented. No other changes are anticipated for this procedure.

2.2.5 Test of DSREDS/EDCARS Site Procedure 5: Final Acceptance

The purpose of this test is to validate that Procedure 5 of the DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures is adequate for performing final acceptance.

2.2.5.1 Results: Test of DSREDS/EDCARS Site Procedure 5

This test was conducted in a walk-though fashion because most of the forms identified in the procedure are not currently in use. The suggested changes were as follows:

a. The word "assumes" should be replaced by "requires that" in Paragraphs 4.5 (a) and (b).

b. "Accept" should be replaced by "Acceptable" in the Final Acceptance Sheet.

2.2.5.2 Discussion and Analysis: Test of DSREDS/EDCARS Site Procedure 5

The suggested changes listed above should be implemented. No other changes are anticipated for this procedure.

3. SUMMARY AND CONCLUSIONS

The twelve procedures identified in the Contractor and DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures provide a method for ensuring the quality of digital data.

One of the most important outcomes of the site testing was the implementation of two new DSREDS/EDCARS procedures. These procedures, previously considered outside the scope of the task, address contract preparation, and final reviews. Including these procedures in the DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures would help ensure beginning-to-end management of quality.

The Contractor and DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures will be revised to incorporate the changes identified in Section 2. The most critical change is the addition of two new procedures addressing contract preparation and technical reviews and audits. The other changes provide clarity to points that were previously unclear.

DEPARTMENT OF THE ARMY
COMPUTER-AIDED ACQUISITION
AND LOGISTIC SUPPORT (CALS)

(REVISED) **CONTRACTOR SITE DIGITAL DATA ACCEPTANCE/ QUALITY ASSURANCE PROCEDURES**

FINAL

CONTRACT NO. DAAB07-89-D-A047
TASK ASSIGNMENT PLAN NO. 90-005

09 FEBRUARY 1990
REVISED: 16 MARCH 1990
REVISED: 30 MARCH 1990

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless designated by other documentation.

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CONTRACTOR SITE
DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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1. INTRODUCTION

This document, "Contractor Site Digital Data Acceptance/Quality Assurance Procedures," presents new implementation procedures and recommendations for quality assurance (QA) and acceptance of digital data. To aid in understanding this process, we first discuss a generic data flow that is appropriate for most production environments (please refer to block diagram Figure 1-1).

The data, as created by the provider, is subject to 100% quality assurance performed by the provider to ensure the quality of the data through visual inspection. Prior to shipment to the receiver, the government may require additional quality assurance of the data. The data is then transmitted to the receiver. The receiver imports the data and verifies completeness of all supplied information. Once the data package has been verified to be complete, quality assurance procedures are performed on the data. Finally, the receiver site formally notifies the provider of data acceptance.

The flow of digital data from a contractor to a DSREDS/EDCARS (Digital Storage and Retrieval Engineering Data System/ Engineering Data Computer Assisted Retrieval System) site, in

Generic Flow of Data

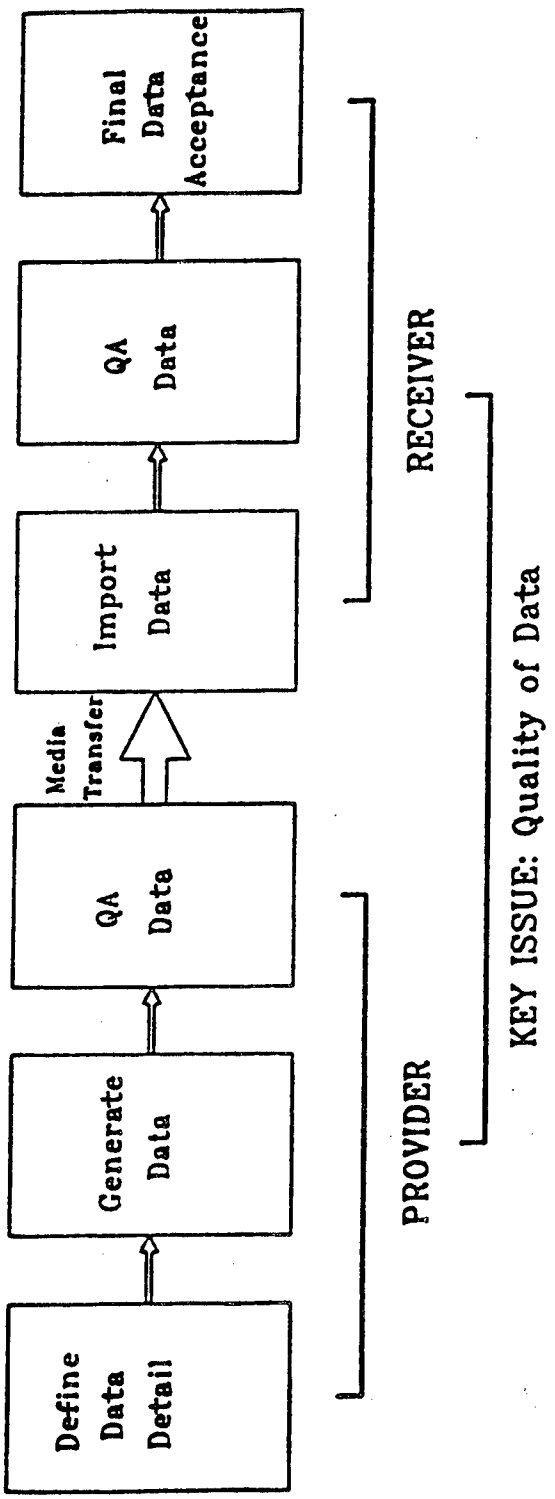

Figure 1-1

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general, follows the same pattern as described above. The contractor generates the digital data based on:

1) DSREDS/EDCARS format

or

2) Computer-Aided Acquisition and Logistic Support (CALS) requirements.

The contract will define the requirements for the production of digital data and the media for transporting this data into a DSREDS/EDCARS or CALS compliant (1840A/28002 format) image system. The government engineering, competitive advocacy, configuration management, or other designated personnel will conduct the necessary in-process design reviews of Level 1 (Development Design) and Level 2 (Limited Production) and final reviews of the Production Level 3 data. These reviews of the Engineering Drawing Package (EDP) will be conducted on the source digital data as specified in MIL-HDBK-288.

The digital data undergoes several conversions prior to reaching permanent storage. In order to reduce the potential for compromise of data integrity, standardized digital data acceptance and quality assurance procedures need to be implemented at both the providing and receiving end of the process. This document places emphasis on the provider end of the process.

The contractor/government flow of data is depicted in Figure 1-2. The figure depicts both DSREDS/EDCARS formatted data and CALS compliant (1840A/28002) data being generated by the contractor. Currently, only DSREDS/EDCARS formatted data may

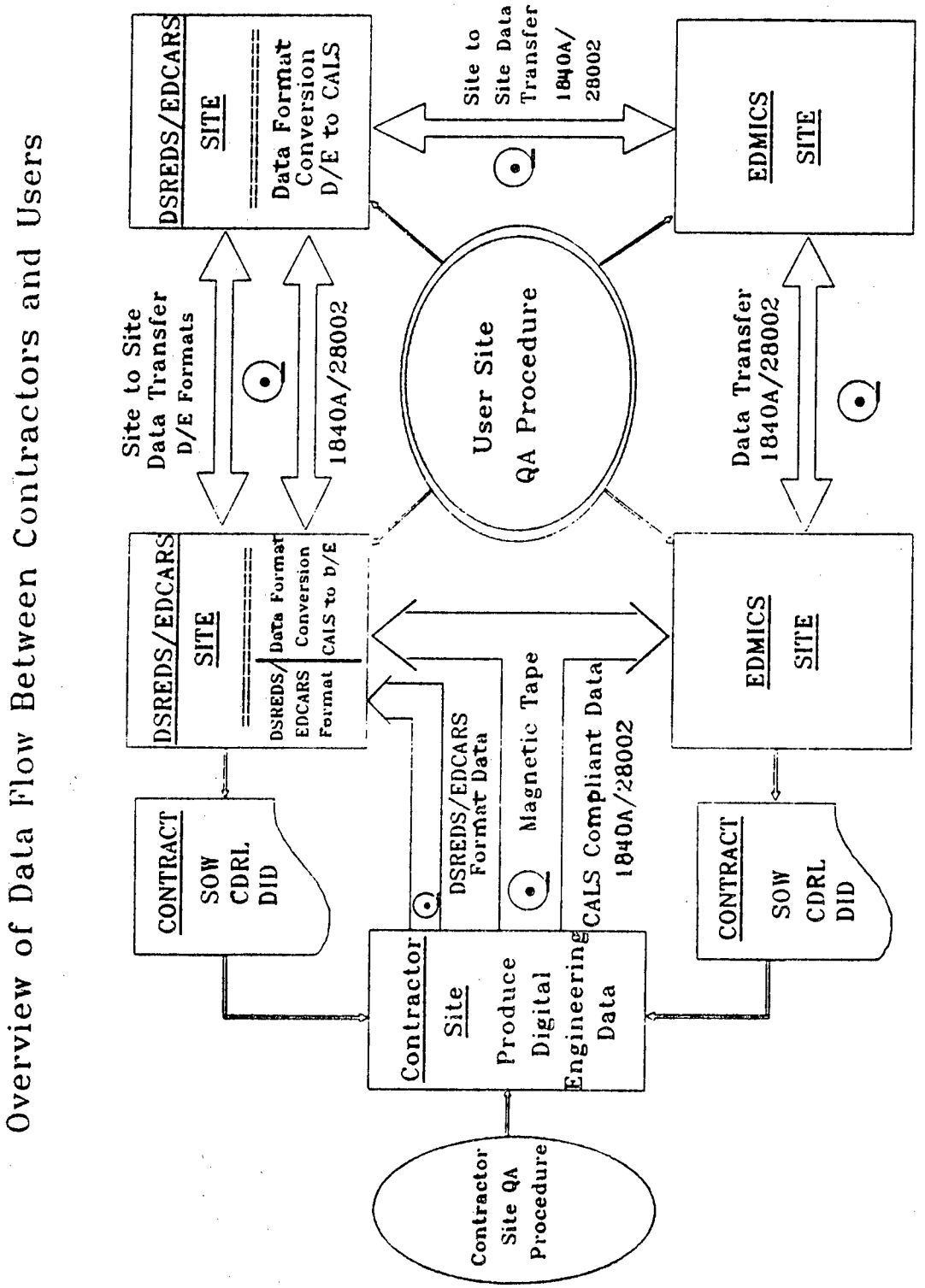
Overview of Data Flow Between Contractors and Users
DSREDS/EDCARS
SITE
Data Format
Conversion
D/E to CALS
Site to
Site Data
Transfer
1840A/
28002
EDMICS
SITE
Site to Site
Data Transfer
D/E Formats
1840A/28002
User Site
QA Procedure
Data Transfer
1840A/28002
DSREDS/EDCARS
SITE
DSREDS/
EDCARS
Format
Data Format
Conversion
CALS to D/E
EDMICS
SITE
CONTRACT
SOW
CDRL
DID
DSREDS/EDCARS
Format Data
Magnetic Tape
CALS Compliant Data
1840A/28002
CONTRACT
SOW
CDRL
DID
Contractor
Site
Produce
Digital
Engineering
Data
Contractor
Site QA
Procedure

Figure 1-2

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be imported into the system since a conversion process from 1840A to DSREDS/EDCARS format does not exist.

The contract and the data acceptance/quality assurance procedures govern the creation, the transmission, and finally, the acceptance of digitized data. The procedures provide the structured assistance that is required to maintain standards of quality assurance, and provide a means for data acceptance by the government representative.

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2. SCOPE

This document recommends digital data quality assurance procedures for use by a government representative at the contractor site. This document is the second of a series of deliverables under Task Execution Plan 90-005, and is delivered in tandem with a similar document, "DSREDS/EDCARS Site Digital Data Acceptance/Quality Assurance Procedures."

This document addresses the digital data transfer between contractor and government sites. It does not address intersite transfer between DSREDS and EDCARS sites. The transfer of data via aperture cards was discussed in the previous document, "Applicable Digital Data Standards/Procedures Report." When the mechanisms for the transfer of digital data via optical disk are formally defined, these procedures could be implemented, as appropriate, for the contractor quality assurance and government digital data acceptance of data submitted on optical disk. The transfer of digital data on magnetic tape is the current media of choice for the present and the immediate future, within the framework of CALS and DSREDS/EDCARS. Digital data may be currently imported into DSREDS/EDCARS via optical disk when large volumes of engineering drawing data must be transferred.

The attached appendices provide additional information in the format of a sample Statement of Work, and Sample Forms for Quality Assurance and Data Acceptance. These documents assume a contract environment where DSREDS/EDCARS formatted and CALS compliant magnetic tapes are required by the government. In

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the long term, the CALS compliant (1840A/28002 format) digital data format may be required for all government awarded contracts.

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3. APPROACH

There are various quality assurance procedures in place and operating at contractor sites. These procedures were developed specifically for engineering drawing data delivered on aperture cards. With the move to magnetic tape and optical disk as the deliverable media, the existing procedures are no longer appropriate for digital data. The existing quality assurance procedures are often system dependent and vary from one contractor site to another. In the absence of unified quality assurance procedures, it is difficult to maintain a standard of data quality at all contractor sites. It is also a difficult task for a government representative to verify that the engineering drawing data generated by contractors meets the government quality assurance standards.

To aid this process and provide the U.S. Government a standard of quality assurance at all sites, new QA procedures are recommended in this document. These procedures will provide a government representative with guidelines to help determine whether the data generated by a contractor meets the required standard without having to examine the idiosyncracies of each contractor system.

The objectives of these procedures are to ensure that:

1. The contractor has a government approved quality assurance program in place for the production and quality assurance of digital data.

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DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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2. The contractor has been qualified by a government agency to produce digital data in the format and on the media specified by the contract.
3. The contractor has performed 100% quality assurance of the digital data to be delivered under the contract.
4. The contractor will provide the resources for on-site government statistical sampling of digital data as specified by the contract.
5. The contractor has packaged the digital media properly with the associated document identifier report (data list), and other data acceptance, certification, or warranty documents specified by the contract.

In the future, the CALS standard and specification, MIL-STD-1840A and MIL-R-28002, will be implemented. It is also understood that DSREDS/EDCARS sites are planning to upgrade their systems to accommodate new CALS standards. External exchange of engineering drawing data may be in CALS compliant (i.e., 1840A/28002) format or in DSREDS/EDCARS format. In due course, conversion facilities will be in place to conduct necessary data conversion between CALS compliant and DSREDS/EDCARS format. While total CALS compliance is the aim for the future, this document also addresses the short term need for accepting data in DSREDS/EDCARS format.

Ideally, all the quality assurance procedures should be automated. However, with current technology and existing facilities, this is not always possible. Consequently, the procedures suggested in this report will only consider the available technology and facilities and focus on manual and, to a certain degree, semi-automated procedures.

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4. DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES

Prior to implementation of the recommended procedures, the contractor will have created the engineering data in accordance with standard drawing practices and will have conducted all technical reviews and met acceptance criteria for the level 1 data (Development Design) and level 2 data (Limited Production) prior to preparation of the level 3 data (Production) addressed herein. A sample Statement of Work (SOW) is presented in Appendix A which specifies the requirements for the preparation and QA of the production data, in CALS compliant format on magnetic tape. A contract will include the actual SOW.

The procedures described in this section will be used by the government representative to assure that 100% quality assurance of the data has been performed by the contractor prior to being delivered to the government. The same procedure will also be used by the government representative for statistical sampling and acceptance of the data at the contractor site as specified in the contract. An overview of the quality assurance and acceptance of data is shown in Figure 4-1 and includes the following procedures for use by the government representative.

4.1 Procedure 1 - Contractor Source System Validation and Data Preparation

Procedure 1 determines that the contractor's source system has the capability to produce digital data on media specified in the contract. Contractors who rely on previous validation

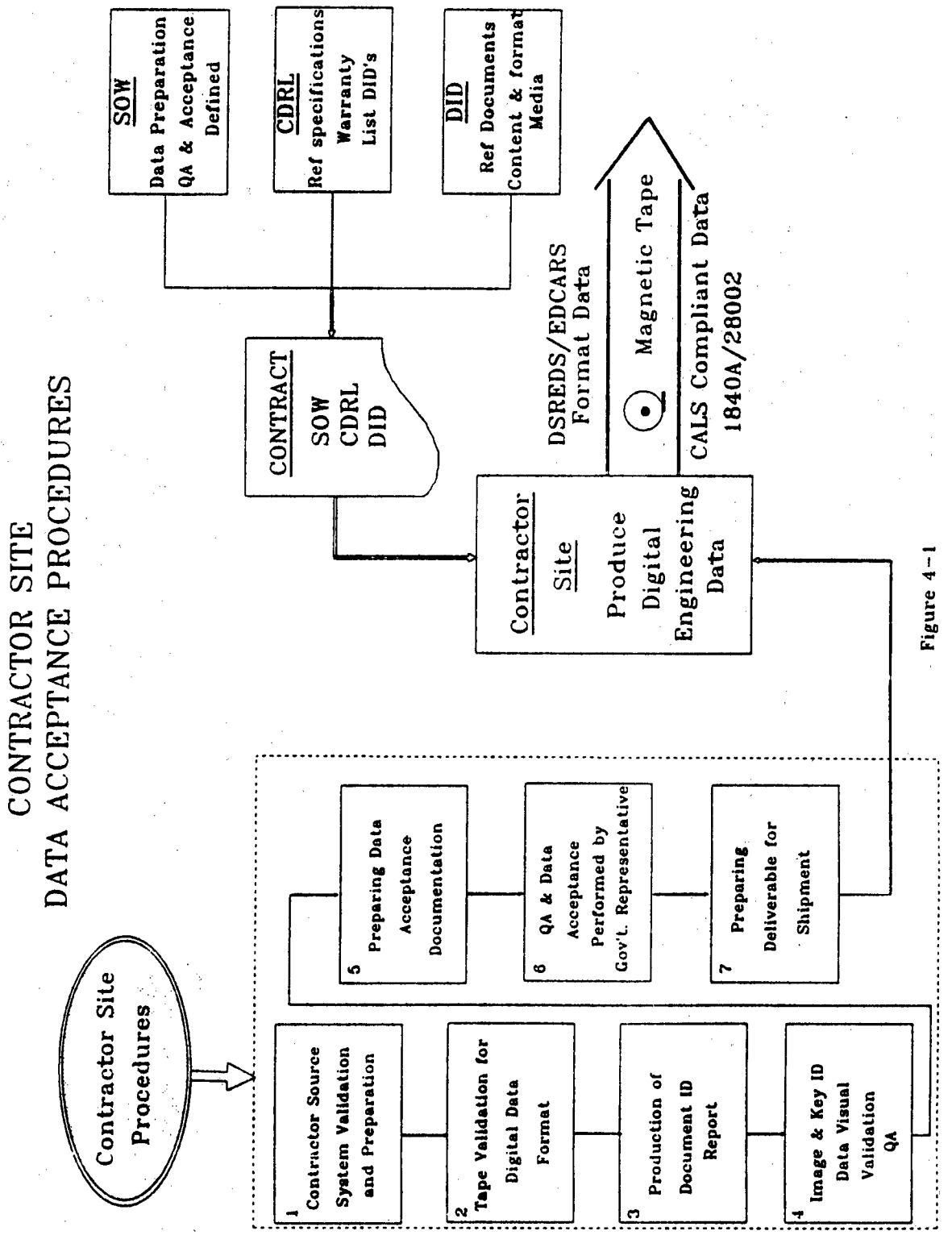
CONTRACTOR SITE
DATA ACCEPTANCE PROCEDURES
SOW
Data Preparation
QA & Acceptance
Defined
CDRL
Ref specifications
Warranty
List DID's
DID
Ref Documents
Content & format
Media
CONTRACT
SOW
CDRL
DID
DSREDS/EDCARS
Format Data
Magnetic Tape
CALS Compliant Data
1840A/28002
Contractor
Site
Produce
Digital
Engineering
Data
Contractor Site
Procedures
1 Contractor Source System Validation and Preparation
2 Tape Validation for Digital Data Format
3 Production of Document ID Report
4 Image & Key ID Data Visual Validation QA
5 Preparing Data Acceptance Documentation
6 QA & Data Acceptance Performed by Gov't. Representative
7 Preparing Deliverable for Shipment

Figure 4-1

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must furnish evidence that prior government approval is appropriate for the current contract. Prior to accepting data, the government representative will document that the contractor has completed the validation process.

4.1.1 Source System Validation

As specified in the contract, the contractor has completed a validation process to produce one or more of the following:

a. DSREDS/EDCARS formatted magnetic tapes containing EBCDIC CCITT Group 4 Wrap-around raster data;
b. MIL-STD-1840A formatted magnetic tapes containing Type I, raster data CCITT Group 4 (MIL-R-28002).
c. Optical disk in accordance with DSREDS/EDCARS specified formats.

4.1.2 Quality Assurance Program

The government representative will validate that the contractor has a government sanctioned quality assurance program in place for the production and quality assurance of digital data in the format and on the media specified in the contract. The contractor will provide documentation for the government representitive's review that shows that the Government has previously approved the contractor's quality assurance system.

4.1.3 Data Preparation

The contractor will have prepared the data and conducted internal quality assurance in accordance with the contract prior to its storage on the specified digital media. As shown in Figure 4-1, the contract will address the preparation and acceptance of data via supporting documents such as a SOW, CRDL's and DID's. The government representative will verify this prior to accepting Level 3 data or Level 2 data when required.

4.2 Procedure 2 - Magnetic Tape Format Validation

The Contractor will run validation software against the digital data formatted magnetic tape or other specified media to demonstrate compliance to either DSREDS/EDCARS or CALS format. The two formats differ significantly, both in form and content. Both are addressed in this procedure. The government will provide the validation software to the contractor. The contract may specify that the government will provide reference data to the contractor and the contractor will provide a test tape initially for validation by the government at the using site.

The DSREDS/EDCARS format presents key information in a specific order, first the Basic Document Information Segments and then the Accompanying Document Information Segments, which are directly inserted to the Directory and TIF databases. The record layouts contain EBCDIC data and are written by COBOL programs. The pixel data is presented within each image

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sequentially, and the raster representation is CCITT Group 4 with Wrap-around.

The CALS 1840A/28002 format presents the header records (Declaration files) of all images first, in ASCII, followed by all image records (raster data files), in CCITT Group 4 format. This data must be converted to DSREDS/EDCARS format before it can be inserted into the DSREDS/EDCARS System.

4.2.1 Validation - DSREDS/EDCARS Format

The contractor will run Government-furnished validation software against the DSREDS/EDCARS compliant digital media and will produce a report showing that the digital data conforms to the DSREDS/EDCARS digital data format.

In lieu of available Government software, the Government may specify in the contract that the validation will be performed at the DSREDS or EDCARS site by the Government.

The DSREDS/EDCARS Format Specifications will be provided to the contractor for proper preparation of the digital media to be delivered.

4.2.2 Reports - DSREDS/EDCARS

The contractor will produce a report that verifies that the data has been properly written in DSREDS/EDCARS format. If the DSREDS/EDCARS site performs the tests, they will produce this report. This can be accomplished by testing the data type of the

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Key Information fields and printing their values. If the tape fails at this point, the tape is rejected. A sample DSREDS/EDCARS validation report (Document Identifier Report) is contained in Appendix B.

4.2.3 Validation - 1840A/28002 Type I Format

The contractor will run validation software (e.g., the CALS Test Network tape validation software) against CALS compliant tape and will produce a report, showing that the tape conforms to MIL-STD-1840A.

a. Declaration Files: As specified in MIL-STD-1840A, all declaration files will precede all data files within a transaction group. Each declaration file will consist of those elements called out in the appropriate paragraphs of MIL-STD-1840A.

b. Data Files: MIL-STD-1840A defines the product data file types, data file names and data file header records. Engineering drawing documents are Type I raster data only and are described in the appropriate MIL-STD-1840A paragraphs.

4.2.4 Reports - 1840A/28002

The contractor will produce a report that verifies that the 1840A standard has been satisfied. This can be accomplished because specific header key words are defined to occur in a certain sequence. If the tape fails at this point, the tape

is rejected. A sample MIL-STD-1840A Validation Report (Document Identifier Report) is contained in Appendix B.

4.3 Procedure 3 - Creation of Document Identifier Report

The contractor will create a Document Identifier Report (data list) which provides the key identification data of the image data recorded on the contract specified digital media. It is essential that this report accurately track the data recorded on the deliverable media. This report is essential for the visual validation of the image identification data during the quality assurance process at the image workstation and for final acceptance at the receiver site. A sample Document Identifier Report is contained in Appendix B, which is applicable to DSREDS/EDCARS and CALS.

For DSREDS/EDCARS, the contract will specify the specific data layouts required to construct a DSREDS/EDCARS formatted tape or other media as specified in the contract. The DSREDS/EDCARS format spreads the key field data over several contiguous record types and contains more information than will fit on one 80-byte record. However, the fields identified below for CALS compliant data are all present within the DSREDS/EDCARS tape format.

For CALS, the contract will specify the specific type codes to be used in the data file header record 1 as specified in MIL-STD-1840A (dated 22 December 1987 with Change Notice 1 of 20 December 1988) paragraph 5.1.5. MIL-STD-804B paragraphs 5.1.9(a) (1) through (21) below define the order in which the record information will be placed in the 80-byte string of

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data elements of file header record 1. The following is excerpted from MIL-STD-1840A (dated 22 December 1987 with Change Notice 1 of 20 December 1988):

1. Type of document (card columns 1 and 2)
2. Document number (card columns 3-17)
3. Code identification number (card columns 18-22)
4. Revision letter (card columns 23 and 24)
5. Kind of accompanying document number (card columns 25 and 26)
6. Accompanying document number (card columns 27-33)
7. Revision letter (card column 34)
8. Open (card columns 35-38)
9. Card number (card columns 39-42)
10. Number of cards (card columns 43-46)
11. Rights (card column 47)
12. Control activity (card columns 48 and 49)
13. Card Code "H" (card columns 50 and 51)
14. Security classification (card column 52)
15. Revised code (card column 53)
16. Image Plane-Back Code (card column 53)
17. Image Plane-Face Code (card column 53)
18. Aperture (card columns 54-76)
19. Rejected code (card column 77)
20. Camera microfilm code (card column 77)
21. Open (card columns 78-80)

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4.4 Procedure 4 - Visual Validation of Image, Key Identification Data, and Contract Specific Requirements

This procedure requires that Procedures 1 through 3 have been performed successfully and that the contractor system hardware and software are operational.

4.4.1 Image Validation (Legibility and Reproducibility)

a. Retrieve an image from the image data base and review on a high resolution image workstation monitor.

b. Determine that the overall image content is distinct and easily separated from the background. This will require pan, zoom, and scroll operations for images that are larger than the display device can accommodate.

c. All features such as lines, text and symbols must be legible. That is, lines are complete and solid; text including numbers can be read by the operator. Signatures are generally excluded from this requirement.

d. The entire border shall exist and be inspected to determine that the image within the border has not been cropped (cut off with a piece missing).

e. The image shall not be noticeably skewed, i.e., image is aligned parallel to the workstation x or y axis.

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f. Lines throughout the image areas shall be distinctly separated.

g. Retrieve the next image and repeat items b through g until the QA process is complete.

4.4.2 Key Identification, Format, and Contract-Specific Requirements Validation

The Document Identifier Report will be marked to show, for each image, acceptance or rejection and, if rejected, the specific identification field(s) (document number, revision letter, etc.) that failed.

The fields that must be compared between the report and visual display are:

a. Document Number
b. Document Type
c. CAGE (Contractor and Government Entity [FSCM])
d. Revision Letter
e. Sheet Number (may not be displayed at all sites)
f. Image Number (Card number or frame number)

The 100% QA of the source for the digital data by the contractor should include completeness review, format reviews, and legibility reviews. In addition, there may be other fields specified and dependent on specific contract requirements. For example; Accompanying Document Kind, Accompanying Document Number, and Accompanying Document Revision Letter.

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4.5 Procedures 5 - Preparing Data Acceptance Documents

This section describes the procedure the contractor shall follow when the visual validation is complete and the deliverable digital data media is prepared for government representative review.

4.5.1 Data Acceptance Sheet

Prepare a Data Acceptance sheet containing summary information from the Document Identifier Report. When magnetic tape media is used, this sheet will include the following as a minimum:

a. Magnetic Tape Volume Serial Number
b. Number of Documents
c. First and Last Document Number
d. Contractor signature and date certifying 100% contractor QA.
e. Contract Number

Appendix B contains a sample Data Acceptance Sheet.

4.5.2 Sign-Off Package

This package includes the completed Document Identifier Report signed by the QA operator, its associated magnetic tape, and the Data Acceptance Sheet for Procedure 6.

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4.6 Procedure 6 - Quality Assurance and Data Acceptance Performed by Government Representative

The government representative, as specified in the contract, will be notified by the contractor that the digital data has been subjected to 100% QA and is ready for statistical sampling quality assurance and acceptance by the government representative.

The representative will first review contractor furnished documents for completeness and accuracy. They may include a Document Identifier Report, a Data Acceptance Sheet, or contract specified contractor quality assurance inspection records.

The government representative will perform quality assurance sampling at the contractor furnished image workstation in accordance with statistical sampling procedures such as MIL-STD-105 and the specific requirements of the contract. If the QA meets the sampling criteria, the government representative will accept the data by signing the same Data Acceptance Sheet signed by the contractor. In addition, the magnetic tape or optical disk will be packaged and labeled properly for shipment, and upon approval by the government, will be shipped. The shipping method will be specified by the contract.

The contract may provide alternatives for the statistical quality assurance sampling of the digital data on the contractor deliverable media. These alternatives include:

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1. Quality assurance sampling by qualified subcontractors approved by the government prior to importing to DSREDS/EDCARS.

2. Quality assurance sampling by the government on stand-alone equipment prior to importing to DSREDS/EDCARS.

If the data does not meet the sampling criteria as specified in the contract, the digital data will be rejected and the contractor will correct the rejected data. The contractor will then verify that he/she has performed 100% QA and the acceptance process will be repeated by the government representative.

4.7 Procedure 7 - Preparing Deliverable for Shipment

It is recommended that packaging, protection, marking, encoding, and shipping will be performed using standard business practices and conform to those procedures outlined in MIL-STD-1840A, specifically paragraph 5.3. Additional reference may be made to document MIL-B-131 and ASTM D 3951. Note that magnetic tape is addressed; however, optical disk media, when used, must also be packaged properly.

4.7.1 Packing Slip

a. A packing slip, showing the volume serial numbers, data file names, date of creation, and a copy of the Document Identifier Report will accompany every tape reel. A sample packing slip is contained in Appendix B.

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b. A data delivery may include more than one magnetic tape reel. If this is the case, it will be clearly indicated, and each reel in the series must be identified as "tape x of y."

c. The packing slip must identify the production site and the destination site.

4.7.2 Protection

The packaging of the deliverable shall be checked in accordance with MIL-STD-1840A, Par. 5.3.1.1, to ensure it is protected from exposure to the close proximity of electric motors, magnets, and scanning devices. Any additional instructions for protection are specified by the contract or other form of agreement if applicable.

4.7.3 Packaging

a. The tapes will be placed in barrier bag or barrier sheet material, in conformance to Type I Class 2 of MIL-B-131, with at least one of the laminants containing aluminum foil. The package shall then be placed in an appropriate shipping carton.

b. The exterior packaging shall conform to ASTM D 3951.

c. The tapes and external packing will be clearly and conspicuously marked with warning labels, as per MIL-STD-1840A.

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5. SUMMARY

This summary identifies the most important aspects of the Contractor Site Procedures, and reiterates the steps taken in determining the approach of this document.

This set of procedures, when validated in the field, will provide the basis for improved operational support. Digital image data interchange promises higher quality technical data, delivered at a lower cost, with decreased turnaround time. However, to realize these gains in productivity and responsiveness, it is necessary for the defense community to implement standardized data acceptance and quality assurance procedures.

The single most important concept within this document is that of relocating the majority of quality assurance and data acceptance operations closer to the source of the data, i.e., at the contractor site. The benefit is to reduce the effort within the government while maintaining or improving the overall quality of the data.

The concept of placing responsibility for data integrity at the contractor site provides the following benefits:

a. Improved contract definition of data preparation and acceptance procedures.
b. Increased use of AFPRO and ARPRO to inspect data.
c. Unified contractor procedures for producing and inspecting digital data.

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The emphasis in this document has been to provide the government with both a short-term and a long-term solution to the problem of standardizing quality assurance and data acceptance procedures. The short-term solution is to continue to accept digital data in a DSREDS/EDCARS compatible format, thus ensuring the government's continued ability to quality assure and accept data. The long-term solution is to devise procedures that also apply to CALS compliant digital data. This long-term approach has also been discussed in the body of this document.

One open issue, outside the scope of this document, is the definition of the sampling criteria to be specified in the contract. The criteria must take into account the on-site quality assurance Reject and Recover process. That is, when any data is found to be unacceptable by the government representative, should the rejection include all data on one magnetic tape, several tapes, only that image, or any combination of the above? The impact of the decision is significant and must be defined in the contract.

The procedures can be implemented at most contractor facilities where engineering data is prepared. It is possible that tedious and subjective visual inspection can, in the future, be reduced with computer-assisted quality assurance.

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APPENDIX A

SAMPLE

STATEMENT OF WORK

FOR

TECHNICAL DATA DELIVERY

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TECHNICAL DATA DELIVERY
STATEMENT OF WORK

-SAMPLE-

1. General

1.1 The (NAME OF PROCURING AGENCY) utilizes the (ADD DSREDS, EDCARS OR EDMICS HERE) for storage and retrieval of unclassified level 3 (Production) engineering data. Level 3 data is essential for the maintenance, modification, logistics and engineering support of the production item or system. This data is also essential for the competitive reprocurement of the contract end items that are depicted.

1.2 The storage and retrieval of classified and limited rights data utilize the following facilities.[1]

1.3 This Statement of Work (SOW) provides general requirements for the procurement of digital data on magnetic tape media. The contract and supporting CDRLs will further define the criteria that are specific to the particular engineering drawing data requirements of the procuring agency.

[1] The Army, Air Force and Navy may handle limited rights data differently on the DSREDS/EDCARS and EDMICS. The general requirements should be defined here and the detailed requirements defined in section 3.

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2. Referenced Documents

2.1 The following documents form a part of this statement of work to the extent specified herein. The applicability is limited to engineering drawing, Type I (untiled) raster data as specifically defined in MIL-STD-1840A and MIL-R-28002.

SPECIFICATIONS

MILITARY

DOD-D-1000 - Drawings, Engineering and Associated Lists

MIL-M-9868D - Requirements for Microfilming of Engineering Documents, 35mm

MIL-R-28002 - Raster Graphics Representation in Binary Format, Requirements For.

STANDARDS

FEDERAL

FIPS PUB 150 - Telecommunications: Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus

FIPS PUB 79 - Magnetic Tape Labels and File Structure for Information Interchange (ANSI X3.27)

MILITARY

DOD-STD-100 - Engineering Drawing Practices

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-1840A - Automated Interchange of Technical Information

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HANDBOOKS

MILITARY

MIL-HDBK-59	-	Computer-Aided Acquisition and Logistic Support (CALS) Program Implementation Guide
MIL-HDBK-288	-	Review and Acceptance of Engineering Drawing Packages

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3. Requirements

3.1 This statement of work addresses the requirements for the delivery of engineering drawing data in digital format on magnetic tape media for use on automated image management systems such as DSREDS, EDCARS, and EDMICS. Emphasis will be placed on the content and format of the digital data as well as the inspection and acceptance of the digital data.

3.2 The contractor shall prepare source data using proven drawing practice standards such as DOD-STD-100 and DOD-D-1000 as specified in section 4.

It is assumed that the contract DIDs and CDRLs adequately and accurately describe the requirements for the Engineering Drawing Package (EDP) and that the contractor has prepared the EDP to meet the requirements of MIL-HDBK-59. It is further assumed that all technical reviews and acceptance criteria of MIL-HDBK-288 have been completed prior to the delivery of the level 3 digital data on magnetic tape media.

3.3 The engineering data shall be delivered in digital format as specified in MIL-STD-1840A and MIL-R-28002 as type I raster graphics. The media for data delivery shall be magnetic tape written in accordance with FIPS PUB 79 as defined for raster files only in MIL-STD-1840A section 5.2.

3.4 The preservation, packaging and marking of the magnetic tape media shall conform to MIL-STD-1840A, section 5.3. Shipping of the magnetic tape will be defined by the contract.

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4. Contractor Data Preparation

4.1 Image Data Preparation - The contractor shall prepare the source engineering documents to meet the format and quality requirements of DOD-D-1000 and DOD-STD-100. The data integrity shall be maintained during the process of digital data conversion. The digitized Type I compressed image data shall then be formatted and recorded on magnetic tape media per MIL-STD-1840A, Section 5.2. The raster image data header shall be recorded as eleven file header records to meet the requirements of MIL-STD-1840A, Section 5.1.4.4. The specific default and permissible values of the Type I data shall conform to MIL-R-28002 for header records 7, 8, 9 and 10 as defined in Sections 3.1.1 and 6.3.

4.2 Document Identifier Data Preparation - The format and content of record 1 for the raster image document identifier data files shall conform to the requirements of section 5.1.5 of MIL-STD-1840A. This format follows MIL-STD-804B paragraphs 5.1.9(a) (1) through (21) with the exceptions specifically identified in 5.1.5 of MIL-STD-1840A.

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5. Inspection and Acceptance

5.1 It is essential that contractual requirements be met to ensure proper acceptance of engineering data on magnetic media in accordance with MIL-STD-1840A and MIL-R-28002. The inspection procedures of MIL-R-28002 for Type I raster data, section 4.3, shall be followed to assure the original document quality is maintained through the scanning and digitizing processes. Source system validation shall be provided for type I raster data by the contractor prior to delivery of data. The contract shall specify the tests and raster graphic test data to conform with section 4.4 of MIL-R-28002. The contract should reference MIL-HDBK-288 for the government's review of the Engineering Drawing Package (EDP).

5.2 Quality Acceptance (QA) of the digitized engineering data will be performed at the contractor's facility before any data is delivered to the government. The contractor is fully responsible for providing quality data and demonstrating to the customer that the data has been prepared in accordance with, and meets the requirements of the contract, MIL-STD-1840A, and MIL-R-28002. This SOW will provide a summary of the requirements for the acceptance/QA at a high resolution image workstation of the Type I image raster header data defined in MIL-STD-1840A, section 5.1.4.4, as well as the associated document identifier record data defined in section 5.1.5 of MIL-STD-1840A.

5.2.1 Scope of Contractor Site QA and Acceptance Requirements

a. The contractor, as stated earlier, is fully responsible for preparing quality engineering document data in digital format. In order to ensure that the data developed meets the

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requirements of MIL-STD-1840A and MIL-R-28002, the contractor will provide 100% QA of the source digital data provided for magnetic tape distribution. In addition, the contract will specify the requirements for in-process reviews of the data preparation and the data acceptance requirements by a government representative at the contractor's site. Any data sampling or data attribute inspection will adhere to MIL-STD-105 as defined by the contract. As a minimum, the contractor shall:

1. Demonstrate that the magnetic tape media meets the physical packaging requirements of MIL-STD-1840A, section 5.3.
2. Demonstrate that the tape file set conforms to MIL-STD-1840A and is internally consistent as to file and header content.
3. Demonstrate that the Type I raster data conforms with MIL-R-28002.
4. Demonstrate that the raster data is being compressed in accordance with CCITT Group 4, T.6 specifications.
5. Demonstrate, at a high resolution workstation, the ability to retrieve any image file from the magnetic tape and display the image for detailed QA of image quality and identification data accuracy. See section 5.2.2 of this statement of work.

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5.2.2 Acceptance and QA of Image and Identification Data at a High Resolution Image Workstation[2]

a. Image Data QA and Acceptance - It is assumed that the magnetic tape data has been formatted and the tape header data has been verified. The image data will now be retrieved from the magnetic tape and displayed for QA.

The operator at the image workstation will have a Document Identifier Report available and will have the ability to select any engineering drawing. The image workstation must, as a minimum, provide the following capabilities:

(1) Provide sufficient spatial resolution to ensure no missing pixel or image information. That is, data integrity of all important image information must be maintained.
(2) Provide screen size that has sufficient area for viewing the entire image (i.e. engineering drawing). All image information must be displayed sufficiently (even a reduced desampled 'C' size image) for drawing content to be verified.
(3) Provide the capability to rotate, pan and zoom (up to desampled pixel level screen resolution), scroll, and reverse video.
(4) Provide an optional capability for multiple workstation QA from the same magnetic tape media source.

[2] NOTE: This is a summary of the QA only and does not replace the formal acceptance and QA procedure required by the contract.

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(5) Provide the ability for the operator to visually QA the image.
The operator will:

- o Check legibility of lines, characters, symbols, for fill-ins and contrast.
- o Check for discontinuity or missing lines.
- o Check for obscure, illegible, omitted or out-of-focus data.
- o Check for separation of lines throughout the image area.

b. Identification Data QA and Acceptance - After the overall image has been viewed, the detail QA will be performed by panning or scrolling the image and using the "zoom" capability. During this operation, the key identification data within the image area will be viewed and compared with a hardcopy printout of the key parameters such as Document Type, Document Number, FSCM, Revision Letter, Image Number, Sheet Number and when applicable Accompanying Kind, Number and Revision Letter. Only after items a. and b. have been completed can acceptance be made.

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5.3 Government Sampling QA and Acceptance

The Contractor will notify the government representative when 100% QA of the digital data has been completed. The government representative will then conduct sampling QA and site acceptance of the data. The contractor site procedures prepared by the government and referenced in the contract will be used by a government representative for acceptance at the contractor site by QA sampling. If the data is acceptable, the government representative will approve by signing a data acceptance sheet.

APPENDIX B

SAMPLE OF FORMS FOR QUALITY ASSURANCE AND DATA ACCEPTANCE

CONTRACTOR
PROCEDURE 1 - SAMPLES

- Contractor documents showing Government approval of the Contractor's system and data are not currently available.

CONTRACTOR
PROCEDURE 2 - SAMPLES

- MIL-STD-1840A Validation Report
- DSREDS/EDCARS Validation Report

SAMPLE
MIL-STD-1840A VALIDATION REPORT
<CONTRACTOR>

Contract Number: ZYXB07-90-D-A001

File: D001

Record:

```
     1:   srcsys:  XYZ, Inc. 123 Main Street, Eatontown, NJ
     2:   srcdocid:  Antenna Mounting Bracket Assembly
     3:   srcrelid:  None
     4:   chglrl:  Original
     5:   dteisu:  19900123
     6:   dstsys:  AVSCOM, Fort Monmouth, NJ
     7:   dstdocid:  AVSCOM Antenna Mounting Bracket Assembly
     8:   dstrelid:  None
     9:   dtetrn:  1990124
     10:  dlvacc 1840A Tape Verification
     11:  filcnt:  R1
     12:  ttlels:  Unclassified
     13:  doccls:  Unclassified
     14:  doctyp:  Assembly Drawing
     15:  docttl:  Antenna Mounting Bracket Drawing Package
*** NO ERRORS FOUND ***
```

File: D001R001

Record:

```
     1:   srcdocid:  Antenna Mounting Bracket
     2:   dstdocdid:  AVSCOM Antenna Mounting Bracket
     3:   txtfilid:  None
     4:   figid: None
     5:   srcgph:  Drawing 100-001
     6:   doccls:  None
     7:   rtype:  1
     8:   rorient:  0
     9:   rpelent:  1728, 2200
     10:  rdensty:  200 pels/in
     11:  notes:  None
*** NO ERRORS FOUND ***
```

SAMPLE
DSREDS/EDCARS VALIDATION REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS	TIME
1234-M-01	PL	54321	AA	0001	002				VALID	10.01
1234-S-003	PL	19886	01	0003	004				VALID	10.02
8540-SM-001	LM	19886	C	0001	001				NO-IMG	10.03

TOTAL VALID DOCUMENTS: 002
TOTAL ERRORS : 001

**** TAPE REJECTED ********

CONTRACTOR
PROCEDURE 3 - SAMPLES

- Document Identifier Report (Contractor)

SAMPLE
DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
1234-M-01	PL	54321	AA	0001	002			
1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

CONTRACTOR
PROCEDURE 4 - SAMPLES

- Document Identifier Report (Contractor)
- Marked Document Identifier Report (Contractor)

SAMPLE
DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
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1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
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1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

CONTRACTOR
PROCEDURE 5 - SAMPLES

- Data Acceptance Sheet
- Marked Document Identifier Report (Contractor)

SAMPLE
DATA ACCEPTANCE SHEET
<CONTRACTOR>

CONTRACT # _____ Letter of Transmittal _____
CONTRACTOR _____ or
DATE SHIPPED _____ DD250 # _____

NUMBER OF TAPES ENCLOSED _____

VOLUME SERIAL 01 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

PACKING SLIP COMPLETED _____ DATE_____

DOCUMENT IDENTIFIER REPORT VALID _____ DATE_____

SHIPMENT _____ OF _____

CONTRACTOR QA 100% _____ DATE SIGNED _____

CONTRACTOR SIGNATURE _____

CONTRACTOR POC _____ TEL# _____

GOVERNMENT REP _____% QA DATE SIGNED _____

GOVERNMENT REP SIGNATURE _____

ACCEPT _____ REJECT _____ DATE _____

NOTES _____

_____

B-11

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
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1234-S-003	PL	19886	01	0003	004			
0033-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

CONTRACTOR
PROCEDURE 6 - SAMPLES

- Marked Document Identifier Report
- Data Acceptance Sheet

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
1234-M-01	PL	54321	AA	0001	002			
1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

SAMPLE
DATA ACCEPTANCE SHEET
<CONTRACTOR>

CONTRACT # _____ Letter of Transmittal _____
CONTRACTOR _____ or
DATE SHIPPED _____ DD250 # _____

NUMBER OF TAPES ENCLOSED _____

VOLUME SERIAL 01 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

PACKING SLIP COMPLETED _____ DATE_____

DOCUMENT IDENTIFIER REPORT VALID _____ DATE_____

SHIPMENT _____ OF _____

CONTRACTOR QA 100% _____ DATE SIGNED _____

CONTRACTOR SIGNATURE _____

CONTRACTOR POC _____ TEL# _____

GOVERNMENT REP _____% QA DATE SIGNED _____

GOVERNMENT REP SIGNATURE _____

ACCEPT _____ REJECT _____ DATE _____

NOTES _____

_____

CONTRACTOR
PROCEDURE 7 - SAMPLES

- Packing Slip
- Marked Document Identifier Report (Contractor)
- Data Acceptance Sheet
- Warning Label

SAMPLE
PACKING SLIP
<CONTRACTOR>

CONTRACT # _____
CONTRACTOR _____
PACKING LIST NUMBER _____
DATE SHIPPED _____

NUMBER ENCLOSED _____

VOLUME SERIAL 01 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____

FILE NAME _____ DATE CREATED _____

CONTRACTOR ADDRESS _____

_____

DESTINATION ADDRESS _____

_____

DATA ACCEPTANCE SHEET PRESENT ____

DOCUMENT IDENTIFIER REPORT PRESENT ____

CONTRACTOR SIGNATURE _____

DATE SIGNED _____

NOTES _____

_____

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

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TOTAL BASIC DOCUMENTS: 002
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SAMPLE
DATA ACCEPTANCE SHEET
<CONTRACTOR>

CONTRACT # _____
CONTRACTOR _____
DATE SHIPPED _____

NUMBER ENCLOSED _____

VOLUME SERIAL 01 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

PACKING SLIP COMPLETED _____ DATE_____

DOCUMENT IDENTIFIER REPORT VALID _____ DATE_____

SHIPMENT _____ OF _____

CONTRACTOR QA 100% _____ DATE SIGNED _____

CONTRACTOR SIGNATURE _____

CONTRACTOR POC _____ TEL# _____

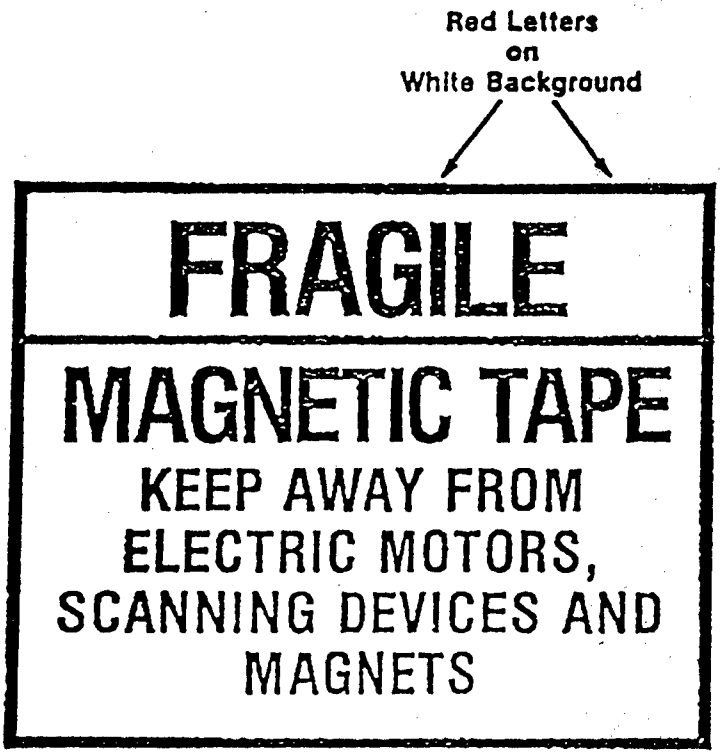
GOVERNMENT REP _____% QA DATE SIGNED _____

GOVERNMENT REP SIGNATURE _____

ACCEPT _____ REJECT _____ DATE _____

NOTES _____

_____


Red Letters
on
White Background
FRAGILE
MAGNETIC TAPE
KEEP AWAY FROM
ELECTRIC MOTORS,
SCANNING DEVICES AND
MAGNETS

DEPARTMENT OF THE ARMY
COMPUTER-AIDED ACQUISITION
AND LOGISTIC SUPPORT (CALS)

(REVISED) DSREDS/EDCARS SITE DIGITAL DATA ACCEPTANCE/ QUALITY ASSURANCE PROCEDURES

FINAL

CONTRACT NO. DAAB07-89-D-A047
TASK ASSIGNMENT PLAN NO. 90-005

09 FEBRUARY 1990
REVISED: 16 MARCH 1990
REVISED: 30 MARCH 1990

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless designated by other documentation.

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DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
30 MARCH 1990

1. INTRODUCTION

This document, "DSREDS/EDCARS Digital Data Acceptance/Quality Assurance Procedures," presents new implementation procedures and recommendations for quality assurance (QA) and acceptance of digital data. To aid in understanding this process, we first discuss a generic data flow that is appropriate for most production environments (please refer to block diagram Figure 1-1).

The digital data as created by the provider is subject to 100% QA performed by the provider to ensure the quality of the data through visual inspection. Prior to shipment to the receiver, the government may require additional quality assurance of the data. The data is then transmitted to the receiver. The receiver imports the data and verifies completion of all supplied information. Once the data package has been verified to be complete, quality assurance procedures are performed on the data. Finally, the receiver site formally notifies the provider of the data acceptance.

The contract will define the requirements for the production of digital data and the media for transporting this data into DSREDS/EDCARS or a CALS compliant (1840A/28002 format) image system. The government engineering, competitive advocacy, configuration management, or other designated personnel will conduct the necessary in-process design reviews of Level 1 (Development Design) and Level 2 (Limited Production) and final reviews of the Production Level 3 data. These reviews of the Engineering Drawing Package (EDP) will be conducted on the digital data as specified in MIL-HDBK-288.

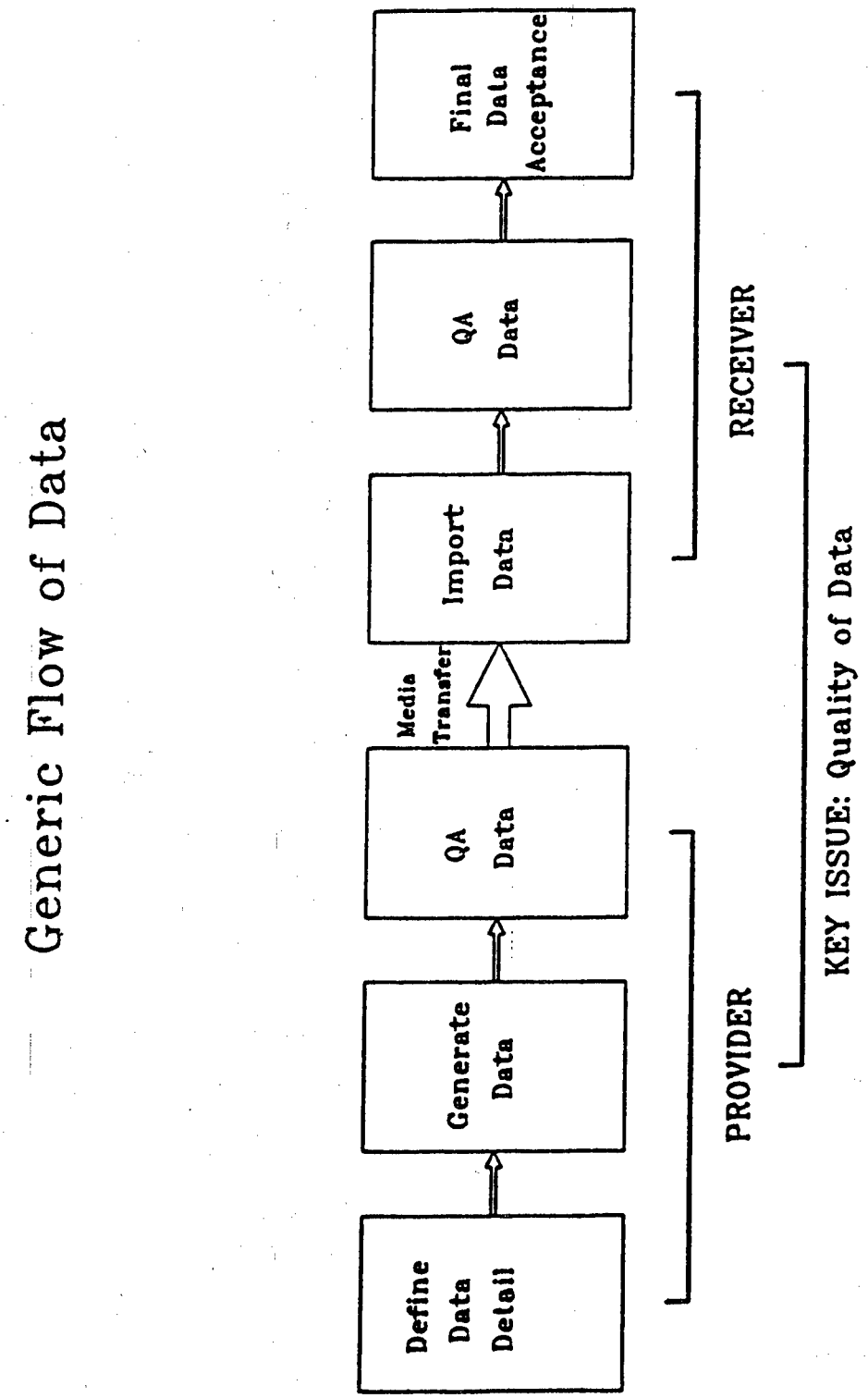
Generic Flow of Data
Define Data Detail
Generate Data
QA Data
Media Transfer
Import Data
QA Data
Final Data Acceptance
PROVIDER
RECEIVER
KEY ISSUE: Quality of Data

Figure 1-1

DSREDS/EDCARS SITE
DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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The digital data undergoes several conversions prior to reaching permanent storage. In order to reduce the potential for compromise of data integrity, standardized digital data acceptance and quality assurance procedures need to be implemented at both the providing and receiving end of the process. This document puts emphasis on the receiver end of the process.

The flow of digital data from a contractor to a Digital Storage and Retrieval Engineering Data System/Engineering Data Computer Assisted Retrieval System (DSREDS/EDCARS) site, in general, follows the same pattern as described above. The contractor generates the digital data based on:

1) DSREDS/EDCARS format or
2) Computer-Aided Acquisition and Logistic Support (CALS) formats.

The contractor generated engineering drawing package (EDP) is accepted by the government in accordance with MIL-HDBK-288. The contractor performs 100% reviews of the final EDP for completeness, format and legibility. In addition the contract may specify QA at the contractor's site by qualified inspectors prior to importing to the DSREDS/EDCARS sites. The digital media will then be imported and the existing DSREDS/EDCARS QA procedures will be used to perform final acceptance of the digital data. The applications of the QA procedures allow for 100% QA or sampling QA by designated engineering, configuration management, competitive advocacy and engineering data personnel. Multiple access to the digital database allows versatility of reviews. For example, engineering may

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perform completeness and format reviews while engineering data may perform final acceptance by viewing for legibility and reproducibility.

The contractor/government flow of data is depicted in Figure 1-2. The transport media is shown as magnetic tape but can be optical disk for DSREDS/EDCARS large volume applications. The figure depicts both DSREDS/EDCARS formatted data and CALS compliant (1840A/28002) data being generated by the contractor. Currently, only DSREDS/EDCARS formatted data may be imported into the system since a conversion process from 1840A to DSREDS/EDCARS format does not exist.

The contract and the data acceptance/quality assurance procedures govern the creation, the transmission, and finally, the acceptance of digitized data. The procedures provide the structured assistance that is required to maintain standards of quality assurance for the government.

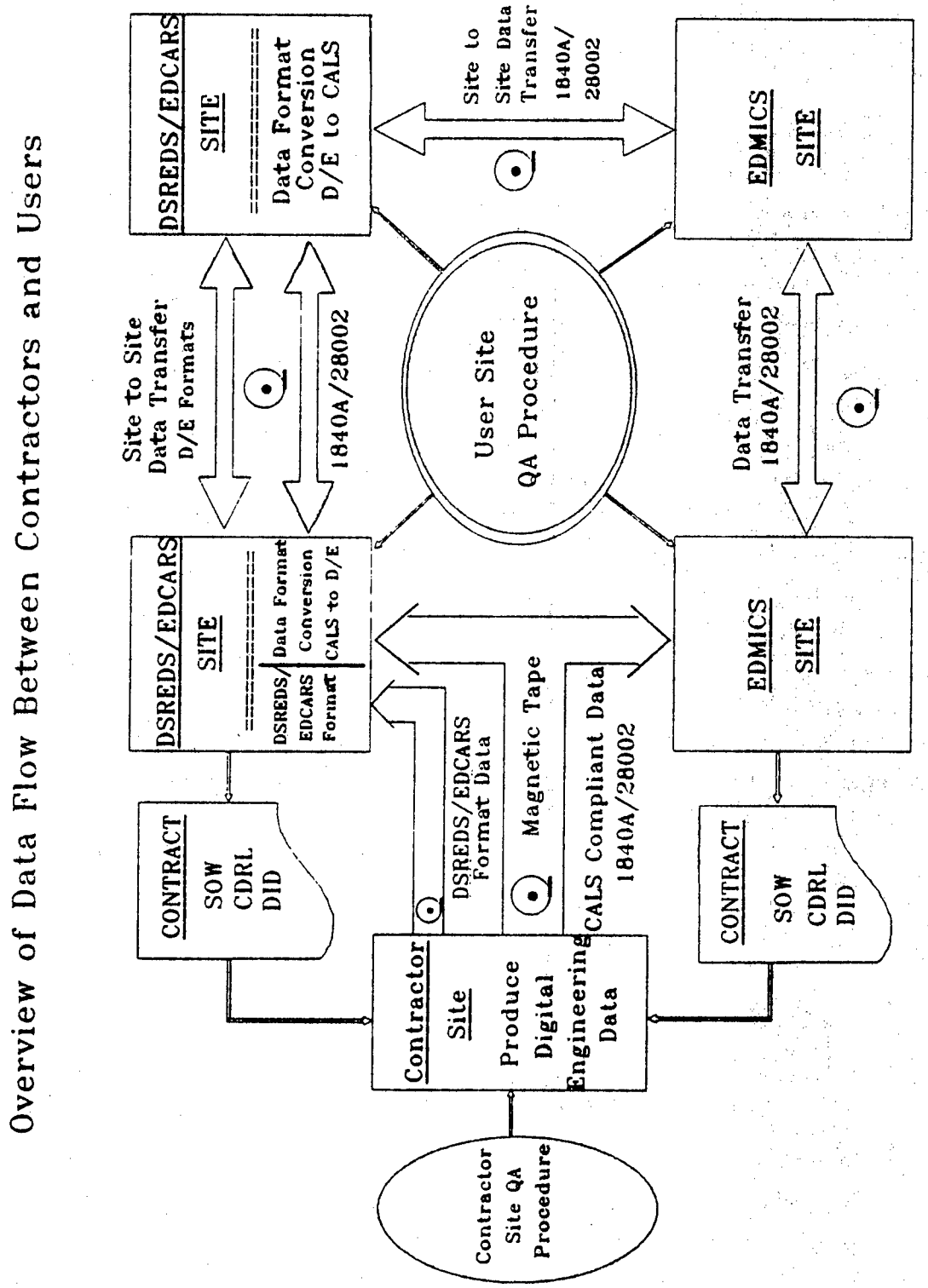
Overview of Data Flow Between Contractors and Users
DSREDS/EDCARS
SITE
Data Format Conversion D/E to CALS
Site to Site Data Transfer 1840A/ 28002
EDMICS
SITE
Site to Site Data Transfer D/E Formats
1840A/28002
User Site QA Procedure
Data Transfer 1840A/28002
DSREDS/EDCARS
SITE
DSREDS/EDCARS Format
Data Format Conversion CALS to D/E
EDMICS
SITE
CONTRACT
SOW
CDRL
DID
DSREDS/EDCARS Format Data
Magnetic Tape
CALS Compliant Data 1840A/28002
CONTRACT
SOW
CDRL
DID
Contractor
Site
Produce Digital Engineering Data
Contractor Site QA Procedure

Figure 1-2

DSREDS/EDCARS SITE
DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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2. SCOPE

This document recommends digital data acceptance and quality assurance procedures for use at DSREDS/EDCARS sites. This is the third of a series of deliverables under Task Execution Plan 90-005. This is delivered in tandem with a similar document, "Contractor Site Digital Data Acceptance/Quality Assurance Procedures."

This document addresses digital data transfer between contractor and government sites. It does not address intersite transfer between DSREDS and EDCARS Sites. The transfer of data via aperture cards was discussed in the previous document, "Applicable Digital Data Standards/ Procedures Report." Although we are aware of one DSREDS site currently importing optical platters, the transfer of data via optical disk platters is not completely defined at this time. Hence, it is not addressed in this document. However, the documented procedures are very similar to procedures that would be used for quality assurance and data acceptance on optical disk media. The transfer of digital data on magnetic tape is the current media of choice for the present and the immediate future, both within the framework of CALS and DSREDS/EDCARS. Digital data may be currently imported into DSREDS/EDCARS via optical disk when large volumes of engineering drawing data must be transferred.

The document that is delivered in conjunction with this one, "Contractor Site Digital Data Acceptance/Quality Assurance Procedures," recommends procedures that can be used at contractor sites by the government for the acceptance and QA

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of digital data. The contractor site procedures would be accomplished prior to the receipt of digital data by a DSREDS/EDCARS site.

The attached Appendices provide additional information in the format of a sample Statement of Work, Detailed Procedures for Import and QA of DSREDS/EDCARS Data via Magnetic Tape, a discussion of contract considerations, and Sample Forms for Quality Assurance and Data Acceptance. These documents assume a contract environment where DSREDS/EDCARS formatted and CALS compliant magnetic tapes are required by the government. In the long term, the CALS-compliant (1840A/28002) digital data format may be required for all government awarded contracts.

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3. APPROACH

To obtain an in-depth understanding of the data acceptance/quality assurance process as it presently exists, several DSREDS/EDCARS sites were visited, as well as two contractor sites. The report on these site visits was delivered on 20 December 1989.

The existing government and industry specifications and standards were also studied and evaluated as to their applicability to the present set of problems. This evaluation is contained in the report, "Applicable Digital Data Standards/Procedures - Final Report," delivered on 15 December 1989.

There are various quality assurance procedures in place and operating at contractor sites. These procedures were developed specifically for engineering drawing data delivered on aperture cards. With the move to magnetic tape as the deliverable media, the existing procedures are no longer appropriate for digital data. The existing QA procedures are often system dependent and vary from one contractor site to another. In the absence of unified QA procedures, it is difficult to maintain a standard of data quality at all contractor sites. It is also a difficult task for a government representative to verify that the engineering drawing data generated by contractors meets the expected government QA standards.

To aid this process and provide the U.S. Government a standard of quality assurance at all sites, new QA procedures are

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DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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recommended in the "Contractor Site-Digital Data Acceptance/Quality Assurance Procedures" document. These procedures will provide a government representative with guidelines to check whether the data generated by a contractor meets the required standard without having to examine the idiosyncracies of each contractor system.

It is planned that the CALS standard and specification, MIL-STD-1840A and MIL-R-28002, will be implemented at U.S. Army and U.S. Air Force sites in the future. Conversion facilities will be in place to conduct necessary data conversion between CALS compliant and DSREDS/EDCARS format. In view of this transition, the QA procedures which deal with engineering drawing data presented in CALS compliant format are also considered in this report. There are seven (7) procedures for the acceptance and QA of digital data on magnetic tape. Four (4) of these procedures are directly applicable to DSREDS/EDCARS formatted data on magnetic tape. Only Procedure 4 addresses the conversion of CALS formatted tape to DSREDS/EDCARS format. Appendix B presents detailed procedures for QA and acceptance of DSREDS/EDCARS formatted magnetic tape only.

Ideally, all the QA procedures should be automated. However, with current technology and existing facilities, this is not always possible. Consequently, the procedures suggested in this report will only consider the available technology and facilities and focus on manual and, to a certain degree, semi-automated procedures.

DSREDS/EDCARS SITE
DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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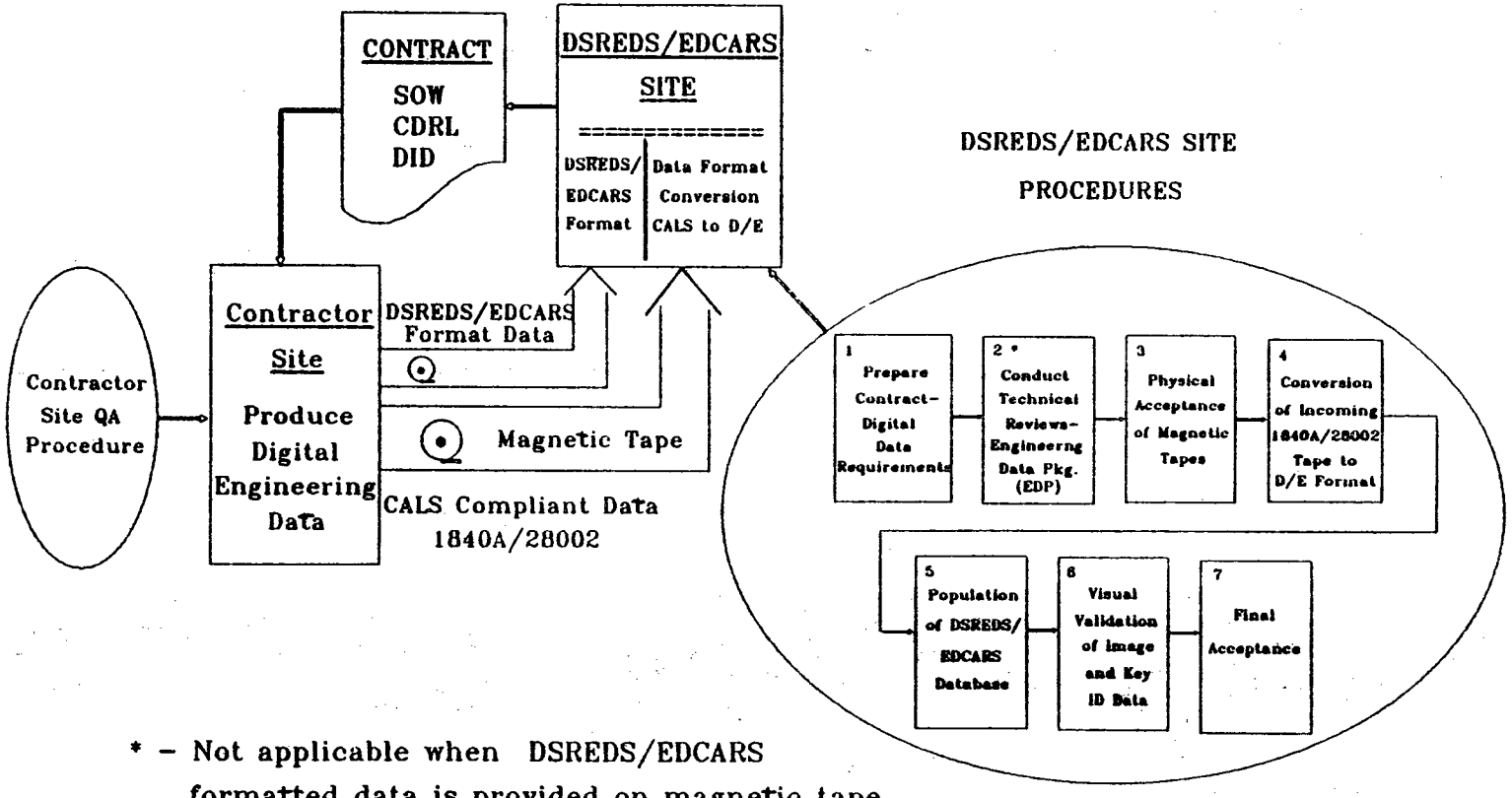
4. DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES

The procedures described in this section address the acceptance and QA of contractor delivered digital data on magnetic tapes, containing engineering drawing data prepared in accordance with MIL-STD-1840A and MIL-R-28002 or DSREDS/EDCARS format.

The contractor has performed 100% QA of the deliverable data and on-site acceptance has been performed by a government representative. These procedures will define physical acceptance requirements for the magnetic tape package, and if necessary the conversion of the CALS compliant data to DSREDS/EDCARS compatible data, and the population of this data to the DSREDS/EDCARS databases. The image data will then be retrieved, displayed, and QA sampling performed at the existing DSREDS/EDCARS image workstations for final acceptance. It is recommended that only QA sampling be performed at the DSREDS and EDCARS sites, however, factors such as contractor performance and volume of data may dictate more or less QA. This recommendation is made because of the 100% QA performed by the contractor and the QA sampling performed at the site by the government representative for contractor site acceptance.

Figure 4-1 presents a diagram of the data acceptance procedures discussed throughout this document.

DSREDS/EDCARS SITE
DATA ACCEPTANCE PROCEDURES



* – Not applicable when DSREDS/EDCARS formatted data is provided on magnetic tape.

Figure 4-1

DSREDS/EDCARS SITE
DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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4.1 Procedure 1 - Government Contract Preparation - Digital Engineering Drawing Data

The DSREDS/EDCARS Procedure One identifies the requirements for the procurement, review and acceptance of digital data via the contract vehicle. The procedure defines the specification, forms and DID documents required for procuring digital data.

The existing contracts are for procuring aperture card, engineering drawing data, to address microfilm production, to inspect and punch hollerith code formats as well as the in-process and final reviews of the Engineering Drawing Package (EDP). Digital data procurement must address the electronic formats, transport media, contractor QA and digital acceptance criteria, as well as the in-process and final reviews of the EDP.

The following steps should generally be adhered to when preparing a contract for digital data delivery:

The electronic format must be well defined, e.g., DSREDS/EDCARS format or CALS compliant format. References should be made to the appropriate military standards to ensure the correct creation and production of the digital data.

The media on which the digital data is expected should also be clearly defined, for example, optical disk or magnetic tape media. Military standards and specifications for the definition of media types should

be referenced. In addition, the means of transporting the media should be clearly delineated.

The DSREDS/EDCARS and Contractor Procedures documents should be referenced in the contract, as a recommended guide for quality issues related to digital data.

The existence of government required in-process or final reviews of the digital data needs to be addressed in the contract, as to their purpose, requirements and time frame. MIL-HDBK-288 should be referenced as the guide for the review and acceptance of the Engineering Drawing Package (EDP).

Finally, any penalties, incentives or warranties regarding the quality of the digital data must be explicitly defined in the contract, so that the contractor will know by what standards and specifications the final engineering drawing package (EDP) will be judged.

4.2 Procedure 2 - Government Conduct Final Reviews - Engineering Drawing Package (EDP)

Before the Engineering Drawing can be written to digital media in anticipation of shipment, it must go through rigorous technical review by the contractor and the government.

The purpose of the technical review is to assure quality in a variety of specific aspects concerning the drawing. These

include the technical content of the drawing, the fonts and line widths used, the media used, the adherence to applicable standards and specifications, and any additional stipulations called out in the contract from which the drawing originated, and correction of any discrepancies detected.

The technical review may be carried out by one organization or a combination of related organizations, such as the competitive advocacy group and the engineering group.

The contract shall specify the requirements for the contractor to adhere to when preparing an EDP. MIL-HDBK-288 will be followed by the government when reviewing the EDP for acceptance. The principal phases of the review process concerning EDP's include:

- Selection of the reviewing activities to be performed
- Review of the contract requirements
- Contractor Indoctrination
- Technical Reviews
- Documenting discrepant EDP's
- Final Reviews
- Recommending acceptance or rejection of the EDP

The final reviews for Level 2 (Limited Production) and Level 3 (Production) engineering drawings and associated data lists are addressed within these procedures. At this stage of the EDP review process, the government has completed all the principal review phases up to the final review and final

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30 MARCH 1990

acceptance or rejection of the EDP. This procedure outlines the steps of the final review.

The final review may be performed by one or more organizations. The overall task is not affected by how many subgroups are required to perform it. The final review must ensure that:

- Previously documented discrepancies have been corrected. (This is determined by engineering personnel and configuration management).
- The final deliverable meets all DoD Specifications.
- The final deliverable meets all DoD Standards.
- The final deliverable meets all terms, conditions, and stipulations of the contract under which it was prepared.
- The technical content of the package is approved by engineering personnel.
- The form and content are approved.
- The deliverable is complete.

  This TDBD (Top-Down-Break-Down) or tiering process ensures that each drawing set contains all appropriate sub-sets thereof. This is generally performed by the engineering group and the competitive advocacy group.
- The image borders are distinct from drawing, and drawing standards are strictly adhered to.
- The drawing passes requirements for legibility and reproducibility.

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DIGITAL DATA ACCEPTANCE/QUALITY ASSURANCE PROCEDURES
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These final reviews must be performed by the contractor on the digital data for the entire EDP, verified by government inspection at the contractor site for new or large volume procurements and at the user site upon importing of the digital data.

The final reviews performed at the DSREDS/EDCARS site on the level 3 (occasionally level 2 data) must include:

- o completeness reviews (TDBD)
- o format (DOD)
- o specific contract requirements
- o legibility and reproducibility

These reviews are performed differently within the DSREDS and EDCARS organizations due to different operating procedures. In general, DSREDS engineering performs all reviews except legibility and reproducibility. The reviews are presently performed on hard copy and aperture cards. Engineering Data then performs final acceptance reviews at the DSREDS image workstation. These reviews are for legibility and reproducibility.

EDCARS utilizes the engineering data personnel at some sites to perform all final reviews. In at least one case engineering and competitive advocacy perform the completeness, format, and special requirements reviews.

The advent of digital data offers alternatives for these reviews. Both the DSREDS and EDCARS engineering personnel are involved in new procurements that specify remote access to the

contractor's database prior to shipment of the final media. This will allow engineering, on other groups having access to the contractor's database, to perform all reviews except legibility and reproducibility. Hard copy or aperture cards of the digital data source may be used as they are now to conduct these reviews.

The DSREDS/EDCARS may be used to conduct all final reviews. The DSREDS/EDCARS compatible data and media would be imported and a database populated. Multiple or single, local and remote image workstations may be used by engineering, competitive advocacy, engineering data or other designated personnel to conduct the reviews. Engineering data would always perform legibility and reproducibility reviews for final acceptance after the other reviews have been completed.

An alternative, in the future, would be the use of stand alone systems that could be used by engineering or engineering data to perform the final reviews prior to importing to DSREDS/EDCARS.

4.3 Procedure 3 - Physical Acceptance of Magnetic Tape

The physical acceptance or rejection of the magnetic tape package shall be administered by the DSREDS or EDCARS designated receiving/inspection section (e.g., Data Engineering). The package shall be checked in accordance with the following criteria and the contractor Data Acceptance Sheet shall be marked accordingly. If the package is rejected

at this stage, a rejection letter, the magnetic tape and associated documents shall be sent to the contractor.

4.3.1 Verification of Packing Slip

The packing slip will be checked to verify contents of the package such as:

a. Magnetic tape quantity
b. Copy of Data Acceptance Sheet
c. Document Identifier Report
d. Other contract specified documents

Samples of a Packing Slip, Contractor Data Acceptance Sheet and a Document Identifier Report, are included in Appendix D.

4.3.2 Verification of Magnetic Tape Packaging and Labeling

The packaging and labeling shall be checked to conform with MIL-STD-1840A, paragraphs 5.3.1.2 and 5.3.1.1, respectively. The packing barrier material shall conform to Type I Class II material of MIL-B-131 and the exterior packaging shall conform to ASTM D 3951.

4.3.3 Verification of Magnetic Tape Protection

The packaging of the deliverable shall be checked in accordance with MIL-STD-1840A, par 5.3.1.1, to ensure it is protected from exposure to the close proximity of electric motors, magnets, and scanning devices. Any additional

instructions for protection are specified by the contract or other form of agreement if applicable.

4.4 Procedure 4 - Conversion of Incoming 1840A/28002 Digital Data to DSREDS/EDCARS Format

This procedure only applies if the contractor tape is in 1840A format. If the tape is in DSREDS/EDCARS format, proceed to Procedure 5.

The incoming Contractor deliverable consists of the magnetic tape, the Data Acceptance Sheet, Packing Slip, and Document Identifier Report. These items have been inspected and validated in Procedure 3.

The incoming magnetic tape is written in MIL-STD-1840A format. Since CALS compliant data is not compatible with the current DSREDS/EDCARS environment it must be converted.

This Procedure requires that the tape be converted from the 1840A standard to DSREDS/EDCARS format: Extended Binary Coded Decimal Interchange Code (EBCDIC) CCITT Group 4 Wrap-around Raster data. The conversion may be performed on whatever hardware/software platform is deemed appropriate.

Steps for data conversion are:

a. Perform Conversion Routine (convert from ASCII/CCITT Group 4 Format to EBCDIC/CCITT Group 4 Wrap-Around Format)

b. Compare the format Conversion Report, produced by Conversion Routine, against the Document Identifier Report provided by the contractor. The reports should match, image by image and each image should have been successfully converted.

c. If any failure occurs, consult the site termination procedures.

d. If this procedure is successful, prepare Conversion Acceptance Sheet, note Date and Time, and Inspector ID.

Samples of a Format Conversion Report, Document Identifier Report and Conversion Acceptance Sheet are included in Appendix D.

4.5 Procedure 5 - Population of DSREDS/EDCARS Databases

The magnetic tape data must be stored into the DSREDS/EDCARS system. This entails populating the correct document identifiers and document control information and pixel data into the Temporary Image File (TIF) and Directory Data Base (DIR), in batches up to 999 documents per batch, and producing the Database Population Report. See Appendix D.

Steps pertaining to database population are:

a. Perform the Database Population Routine (exists in DSREDS/EDCARS system). The output is a Database Population Report.

b. Verify the Database Population Report, produced from the Database Population Routine, against the marked Document Identifier Report provided by the contractor. The reports should match exactly for each image loaded into the data base.

c. If any failure occurs, consult the site termination procedures.

d. If the populate Phase is successful, prepare appropriate Population Acceptance Sheet, note the Date, Time, and Inspector ID.

Samples of the Database Population Report and Population Acceptance Sheet are included in Appendix D.

4.6 Procedure 6 - Visual Validation of Image, Key Identification Data, and Contract Specific Requirements

DSREDS/EDCARS personnel are fully qualified to perform QA for the accept, reject, and suspend process. This procedure is included primarily for completeness and secondly, to emphasize the implementation of sampling QA.

The philosophy of the new QA process is moving responsibility for 100% QA from the government sites to the contractor sites. This results in changes to government site procedures to recommend the usage of sampling techniques rather than quality inspection of all image and data supplied by the contractor.

Each DSREDS/EDCARS site possesses a fully functional QA system which allows the operator to visually inspect each image on a Graphics Display Terminal. The operator may, using an

attached mouse device, pan around the entire image, inspect the intensity and density of the image, verify no bleed-through, verify that the document identification on the image corresponds to its external identification, check the image size and borders, as well as zoom in on any specific area of the image for a detailed inspection.

The QA process, described in detail below, is guided by the Database Population Report. This report includes the Document ID Number, Document Type, FSCM Code, Revision Letters, Card Number and Sheet Number.

This section will explain in detail what steps are to be taken to QA the batches of data populated into the DSREDS/EDCARS Databases.

4.6.1 Steps for Performing Quality Assurance

The quality assurance steps are:

a. Verify that the system is functioning; that is, the equipment has power and all units are ready.
b. Verify that the NETWORK and CICS are up and functioning.
c. Verify that the local area network is functioning if required.
d. Verify that Database Population Report is available.
e. LOGON to the CICS region with your assigned ID and password.
f. If LOGON is unsuccessful, contact your Site Administrator.

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g. Enter the appropriate Transaction ID for your site to display the main menu. Select option 'IMAGE QA'.

h. Select images to be QA'd from the Database Population Report. A sample of the Database Population Report is included in Appendix D.

i. The first selected image is displayed on the screen. If this fails and an error message appears, the digital data encoding scheme has been corrupted. Immediately contact your Site Administrator. This is a severe error with the pixel data itself.

4.6.2 Image Validation (Legibility and Reproducibility)

a. Determine that the overall image content is distinct and easily separated from the background. This will require pan, zoom, and scroll operations for images that are larger than the display device can accommodate.

b. All features such as lines, text and symbols must be legible. That is, lines are complete and solid; text including numbers can be read by the operator. Signatures are generally excluded from this requirement.

c. The entire border shall exist and be inspected to determine that the image within the border has not been cropped (cut off with a piece missing).

d. The image shall not be noticeably skewed, i.e., image is aligned parallel to the workstation x or y axis.

e. Lines throughout the image areas shall be distinctly separated.

4.6.3 Key Identification Validation, Format and Completeness Review

Completeness and format final reviews may be performed from the same database prior to performing the previous legibility and the key ID validation described herein. The internal policies will define what organizations will perform the reviews.

The Database Population Report will be marked to show, for each image, acceptance or rejection and, if rejected, the specific identification field(s) (document number, revision letter etc.) that failed.

The fields that must be compared between the report and visual display are:

a. Document Number
b. Document Type
c. CAGE (Contractor and Government Entity [FSCM])
d. Revision Letter
e. Sheet Number (may not be displayed at some sites)
f. Image Number (Card number or Frame number)

In addition, there may be other fields specified by specific contract requirements. For example, Accompanying Document Kind, Accompanying Document Number, and Accompanying Document Revision Letter.

A sample of a Document Identifier Report is included in Appendix D.

4.6.4 Accept, Suspend or Reject Decisions Per Image

a. Make a judgement regarding the quality of this image (See Appendix B for guidance):

Is image acceptable? (accept)
-or-
Is image questionable? (suspend)
-or-
Is image unacceptable? (reject)

b. Enter decision on image disposition at the terminal (i.e., ACCEPT, SUSPEND, REJECT).
c. The next image in the batch is automatically displayed.
d. Then repeat the above steps for each image in the batch.
e. At the completion of the batch, enter batch disposition, (i.e., Accept, Suspend or Reject).

4.7 Procedure 7 - Final Acceptance

The contract will specify the criteria for acceptance of each batch of deliverable magnetic tape image data. It is recommended that sampling only be performed as discussed in Section 4.6. of this document. The contractor has certified 100% QA of the deliverable image data on magnetic tape and the data has been QA sampled and accepted at the contractor's site by a designated government representative.

The DSREDS or EDCARS site will have final acceptance responsibility. The contract will specify the acceptance documents to be prepared and submitted to the contractor

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(e.g., acceptance sheet by deliverable shipments, DD 250's). Samples of a Final Acceptance Sheet, and a DD 250 Form are included in Appendix D.

a. Acceptance requires that the data has passed the QA sampling requirements of the contract. A letter and contract specified supporting documents will be sent to the contractor indicating acceptance of the delivered magnetic tape digital data.

b. Rejection assumes the data has not passed the QA sampling requirements of the contract. The delivered magnetic tape, any supporting rejection reports, and a rejection letter will be sent to the contractor. Again, the contract must define the acceptance/rejection criteria.

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5. SUMMARY

This summary identifies the most important aspects of the DSREDS/EDCARS Site Procedures, and reiterates the steps taken in determining the approach of this document.

This set of procedures, when validated in the field, will provide the basis for improved operational support. Digital image data interchange promises higher quality technical data, delivered at a lower cost and with decreased turnaround time. However, to realize these gains in productivity and responsiveness, it is necessary for the defense community to implement standardized data acceptance and quality assurance procedures.

The single most important concept employed on the government's behalf is relocating the majority of Quality Assurance and Data Acceptance operations closer to the source of the data at the contractor site. The benefit is to reduce the effort within the government while maintaining or improving overall quality of data.

The concept of placing responsibility for data integrity at the contractor site provides the following benefits:

a. Improved contract definition of data preparation and acceptance procedures.
b. Increased use of AFPRO and ARPRO to inspect data.
c. Unified contractor and government procedures for producing and inspecting digital data.

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The emphasis in this document has been to provide the government with both a short-term and a long-term solution to the problem of standardizing quality assurance and data acceptance procedures. The short-term solution is to continue to accept digital data in a DSREDS/EDCARS compatible format, thus ensuring the government's continued ability to quality assure and accept data. The long-term solution is to devise procedures that also apply to CALS compliant digital data. This long-term approach has also been discussed in the body of this document.

One open issue, outside the scope of this document, is the definition of the sampling criteria to be specified in the contract. The criteria must take into account the on-site QA Reject and Recover process. That is, when any data is found to be unacceptable by the government representative, should the rejection include all data on one magnetic tape, several tapes, only that image, or any combination of the above? The impact of the rejection decision is significant and must be defined in the contract.

It is possible that tedious and subjective visual inspection can, in the future, be reduced with computer-assisted quality assurance. Other issues, which are outside the scope of this document, include:

1. The need to develop and implement an interface for conversion from CALS compliant CCITT Group 4 to DSREDS/EDCARS CCITT Group 4 wrap-around bit map compressed format.

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2. The need to provide conversion from CALS ASCII data to EBCDIC data, and from CALS image data format to DSREDS/EDCARS image data format.
3. The need to provide conversion from CALS image identification format to DSREDS/EDCARS site specific image identification format.

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APPENDIX A

SAMPLE

STATEMENT OF WORK

FOR

TECHNICAL DATA DELIVERY

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TECHNICAL DATA DELIVERY
STATEMENT OF WORK

-SAMPLE-

1. General

1.1 The (NAME OF PROCURING AGENCY) utilizes the (ADD DSREDS, EDCARS OR EDMICS HERE) for storage and retrieval of unclassified level 3 (Production) engineering data. Level 3 data is essential for the maintenance, modification, logistics and engineering support of the production item or system. This data is also essential for the competitive re-procurement of the contract end items that are depicted.

1.2 The storage and retrieval of classified and limited rights data utilize the following facilities.[1]

1.3 This Statement of Work (SOW) provides general requirements for the procurement of digital data on magnetic tape media. The contract and supporting CDRLs will further define the criteria that are specific to the particular engineering drawing data requirements of the procuring agency.

[1] The Army, Air Force and Navy may handle limited rights data differently on the DSREDS/EDCARS and EDMICS. The general requirements should be defined here and the detailed requirements defined in section 3.

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2. Referenced Documents

2.1 The following documents form a part of this statement of work to the extent specified herein. The applicability is limited to engineering drawing, Type I (untiled) raster data as specifically defined in MIL-STD-1840A and MIL-R-28002.

SPECIFICATIONS

MILITARY

DOD-D-1000	Drawings, Engineering and Associated Lists
MIL-M-9868D	Requirements for Microfilming of Engineering Documents, 35mm
MIL-R-28002	Raster Graphics Representation in Binary Format, Requirements For.

STANDARDS

FEDERAL

FIPS PUB 150	Telecommunications: Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus
FIPS PUB 79	Magnetic Tape Labels and File Structure for Information Interchange (ANSI X3.27)

MILITARY

DOD-STD-100	Engineering Drawing Practices
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1840A	Automated Interchange of Technical Information

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HANDBOOKS

MILITARY

MIL-HDBK-59	Computer-Aided Acquisition and Logistic Support (CALS) Program Implementation Guide
MIL-HDBK-288	Review and Acceptance of Engineering Drawing Packages

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3. Requirements

3.1 This statement of work addresses the requirements for the delivery of engineering drawing data in digital format on magnetic tape media for use on automated image management systems such as DSREDS, EDCARS, and EDMICS. Emphasis will be placed on the content and format of the digital data as well as the inspection and acceptance of the digital data.

3.2 The contractor shall prepare source data using proven drawing practice standards such as DOD-STD-100 and DOD-D-1000 as specified in section 4.

It is assumed that the contract DIDs and CDRLs adequately and accurately describe the requirements for the Engineering Drawing Package (EDP) and that the contractor has prepared the EDP to meet the requirements of MIL-HDBK-59. It is further assumed that all technical reviews and acceptance criteria of MIL-HDBK-288 have been completed prior to the delivery of the level 3 digital data on magnetic tape media.

3.3 The engineering data shall be delivered in digital format as specified in MIL-STD-1840A and MIL-R-28002 as type I raster graphics. The media for data delivery shall be magnetic tape written in accordance with FIPS PUB 79 as defined for raster files only in MIL-STD-1840A section 5.2.

3.4 The preservation, packaging and marking of the magnetic tape media shall conform to MIL-STD-1840A, section 5.3. Shipping of the magnetic tape will be defined by the contract.

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4. Contractor Data Preparation

4.1 Image Data Preparation - The contractor shall prepare the source engineering documents to meet the format and quality requirements of DOD-D-1000 and DOD-STD-100. The data integrity shall be maintained during the process of digital data conversion. The digitized Type I compressed image data shall then be formatted and recorded on magnetic tape media per MIL-STD-1840A, section 5.2. The raster image data header shall be recorded as eleven file header records to meet the requirements of MIL-STD-1840A, section 5.1.4.4. The specific default and permissible values of the Type I data shall conform to MIL-R-28002 for header records 7, 8, 9 and 10 as defined in sections 3.1.1 and 6.3.

4.2 Document Identifier Data Preparation - The format and content of record 1 for the raster image document identifier data files shall conform to the requirements of section 5.1.5 of MIL-STD-1840A. This format follows MIL-STD-804B paragraphs 5.1.9(a) (1) through (21) with the exceptions specifically identified in 5.1.5 of MIL-STD-1840A.

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5. Inspection and Acceptance

5.1 It is essential that contractual requirements be met to ensure proper acceptance of engineering data on magnetic media in accordance with MIL-STD-1840A and MIL-R-28002. The inspection procedures of MIL-R-28002 for Type I raster data, section 4.3, shall be followed to assure the original document quality is maintained through the scanning and digitizing processes. Source system validation shall be provided for type I raster data by the contractor prior to delivery of data. The contract shall specify the tests and raster graphic test data to conform with section 4.4 of MIL-R-28002.

5.2 Quality Acceptance (QA) of the digitized engineering data will be performed at the contractor's facility before any data is delivered to the government. The contractor is fully responsible for providing quality data and demonstrating to the customer that the data has been prepared in accordance with, and meets the requirements of the contract, MIL-STD-1840A, and MIL-R-28002. This SOW will provide a summary of the requirements for the acceptance/QA at a high resolution image workstation of the Type I image raster header data defined in MIL-STD-1840A, section 5.1.4.4, as well as the associated document identifier record data defined in section 5.1.5 of MIL-STD-1840A.

5.2.1 Scope of Contractor Site QA and Acceptance Requirements

a. The contractor, as stated earlier, is fully responsible for preparing quality engineering document data in digital format. In order to ensure that the data developed meets the requirements of MIL-STD-1840A and MIL-R-28002, the contractor

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will provide 100% QA of the source digital data for magnetic tape distribution. In addition, the contract will specify the requirements for in-process reviews of the data preparation and the data acceptance requirements by a government representative at the contractor's site. Any data sampling or data attribute inspection will adhere to MIL-STD-105 as defined by the contract. As a minimum, the contractor shall:

1. Demonstrate that the magnetic tape media meets the physical packaging requirements of MIL-STD-1840A, section 5.3.
2. Demonstrate that the tape file set conforms to MIL-STD-1840A and is internally consistent as to file and header content.
3. Demonstrate that the Type I raster data conforms with MIL-R-28002.
4. Demonstrate that the raster data is being compressed in accordance with CCITT Group 4, T.6 specifications.
5. Demonstrate, at a high-resolution workstation, the ability to retrieve any image file from the magnetic tape and display the image for detailed QA of image quality and identification data accuracy. See section 5.2.2 of this statement of work.

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5.2.2 Acceptance and QA of Image and Identification Data at a High Resolution Image Workstation[2]

a. Image Data QA and Acceptance - It is assumed that the magnetic tape data has been formatted and the tape header data has been verified. The image data will now be retrieved from the magnetic tape and displayed for QA.

The operator at the image workstation will have a Document Identifier Report available and will have the ability to select any engineering drawing. The image workstation must, as a minimum, provide the following capabilities:

1. Provide sufficient spatial resolution to ensure no missing pixel or image information. That is, data integrity of all important image information must be maintained.
2. Provide screen size that has sufficient area for viewing the entire image (i.e. engineering drawing). All image information must be displayed sufficiently (even a reduced desampled 'C' size image) for drawing content to be verified.
3. Provide the capability to rotate, pan and zoom (up to desampled pixel level screen resolution), scroll, and reverse video.

[2] NOTE: This is a summary of the QA only and does not replace the formal acceptance and QA procedure required by the contract.

4. Provide an optional capability for multiple workstation QA from the same magnetic tape media source.
5. Provide the ability for the operator to visually QA the image. The operator will:
    1. Check legibility of lines, characters, symbols, for fill-ins and contrast.
    2. Check for discontinuity or missing lines.
    3. Check for obscure, illegible, omitted or out-of-focus data.
    4. Check for separation of lines throughout the image area.

b. Identification Data QA and Acceptance - After the overall image has been viewed, the detail QA will be performed by panning or scrolling the image and using the "zoom" capability. During this operation, the key identification data within the image area will be viewed and compared with a hard copy printout of the key parameters such as Document Type, Document Number, CAGE (FSCM), Revision Letter, Image Number, Sheet Number and when applicable Accompanying Kind, Number and Revision Letter. Only after items a. and b. have been completed can acceptance be made.

5.3 Government Sampling QA and Acceptance

The Contractor will notify the government representative when 100% QA of the digital data has been completed. The government representative will then conduct sampling QA and site acceptance of the data. The contractor site procedures

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prepared by the government and referenced in the contract will be used by a government representative for acceptance at the contractor site by QA sampling. If the data is acceptable, the government representative will approve by signing a data acceptance sheet.

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APPENDIX B

DETAILED PROCEDURES FOR IMPORT AND QUALITY ASSURANCE OF DSREDS/EDCARS DATA VIA MAGNETIC TAPE

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1. INTRODUCTION

DSREDS/EDCARS is an electronic image management system which allows for storage and retrieval of engineering documents in digital form on optical disks. The image data is stored as binary encoded pixel data, and compressed and decompressed as per CCITT Group 4 Compression/Decompression with Wrap-around.

There are several forms of input to the DSREDS/EDCARS system, including, aperture card input, hard-copy input, electronic input via magnetic tape, and electronic input via magnetic tape and optical disk. While the input of data via optical disk is possible, this appendix deals only with the import of data (both header and pixel data) via magnetic tape.

The DSREDS/EDCARS system consists of several hardware and software components, including:

IPL MAINFRAME (EMULATES IBM 4341)
OS/MVS/370/SP OPERATING SYSTEM
COBOL/ASSEMBLER 'H' PROGRAMS
CICS/OS/VS TELECOMMUNICATIONS PRODUCT
IMS/DB DATABASE PRODUCT WITH VSAM SUPPORT
VTAM AND COMTEN TELECOMMUNICATIONS PROCESSOR
AT&T 3B2 AND 6386 BASE SERIES OF MICRO-COMPUTERS
UNIX(R) / 'C' SOFTWARE AND OPERATING SYSTEM
ALPHAREL COMPANDORS AND GDTS AND PROCESSING UNITS
PROPRIETARY 'ARLAN' FROM ALPHAREL
ETHERNET AND X.25 NETWORK CAPABILITIES

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SKANTEK PLOTTING DEVICES
ALPHAREL LASER SCANNING DEVICES
FILENET/OSI OPTICAL DISK DRIVES AND JUKEBOXES

This document specifically addresses image import via magnetic tape, where both the header data and pixel data (image representation in compressed form) are present on the tape, in EBCDIC format, with data encoded according to the algorithms described for CCITT GROUP 4 Compression with Wrap-around.

- The characteristics and format of incoming DSREDS/EDCARS tapes are:
- Standard 9-track magnetic tape media shall be used.
- The character set representation shall be EBCDIC format.
- The labeling of the tape will conform to ANSI "Standard labels" as implemented by IBM. ',Label=(,sl)'

The data record formats will conform to the formats described by the CDRL's delivered for the DSREDS/EDCARs project, and to the AT&T document "OPTICAL DISK FORMATS", which includes a detailed record layout of the various record types to be written to a DSREDS/EDCARS compliant export/import tape.

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1.1 Procedure 1 - Physical Acceptance of DSREDS/EDCARS Magnetic Tape(s)

1.1.1 Verification of Packing Slip

The packing slip will be checked to verify contents of the package such as:

a. Magnetic tape quantity
b. Copy of data acceptance sheet(s)
c. Document Identifier Report
d. Other contract specified documentation

1.1.2 Verification of Magnetic Tape Packaging and Labeling

The packaging and labeling shall be checked to conform with MIL-STD-1840A, paragraphs 5.3.1.2 and 5.3.1.1 respectively. The packing barrier material shall conform to Type I Class II material of MIL-B-131 and the exterior packaging shall conform to ASTM D 3951.

1.1.3 Verify Magnetic Tape Protection

The packaging shall be checked in accordance with MIL-STD-1840A, Par 5.3.1.1, to ensure they are protected from exposure to the close proximity of electric motors, magnets, and scanning devices. Any additional instructions for protection are specified by the contract or other form of agreement.

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1.2 Procedure 2 - Conversion of Incoming 1840A/28002 Digital Data to DSREDS/EDCARS Format

The tape import procedures outlined below apply specifically to a DSREDS/EDCARS site.

These procedures describe the steps to receive data into a site and perform visual data acceptance on the incoming tape data.

1.2.1 Importing Digital Engineering Data From Magnetic Tape. (DSREDS/EDCARS)

A. DSREDS/EDCARS system up and running _____
B. VTAM NETWORK up and running _____
("S VNET" completed from system start-up)
C. TSO INITIALIZED and running _____
("S TCAS" completed from system start-up)
D. CICS region up and running _____
("S CICSTIS4" completed)
("CONTROL IS BEING GIVEN TO CICS" message present on the master console)
E. The Document Identifier Report is available to Operations Personnel _____
F. Login to TSO session using your ID/Password _____
'TSO Loginid / Password'
G. Enter ISPF Editor _____
H. Select JOB ISR26000 _____
I. Enter External Tape Volser _____
J. Position cursor at command line _____
K. Enter command 'SUBMIT' and press enter key _____

L. Observe JOB START on master MVS console _____

M. Observe tape mount request on master MVS console _____

N. MOUNT REQUESTED TAPE on SPECIFIED TAPE DRIVE _____

O. OBSERVE JOB RUNNING and CHKPTS occurring to TIF and DIRECTORY databases _____

P. When Job completes normally, ISR26000 Report from system high-speed printer. _____

Q. Verify Job ran successfully _____

R. If JOB ABENDS or DID NOT run successfully, immediately contact Site Administrator/systems personnel. _____

1.3 Procedure 3 - Population of DSREDS/EDCARS Databases

The quality assurance of digital engineering documents is an essential phase of the data flow through any image management system, such as DSREDS/EDCARS.

DSREDS/EDCARS has a fully functional QA phase which allows the data operator to visually inspect each image on a graphics display terminal. The operator may, using an attached mouse device, pan around the entire image, inspect the intensity and density of the image, verify no bleed-through, verify the document id on the image corresponds to its external id, check the image size and borders, as well as zoom in on any specific area of the image for a detailed inspection.

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The process of tape import (Procedure 2) is the insertion of hundreds or even thousands of graphics images into the DSREDS/EDCARS system via magnetic tape. Images are grouped as 'batches'. A 'batch' is a collection of one or more (up to 999) images grouped under a specific 'batch date' and 'batch time' stamp. One or more 'batches' may be imported via tape in any given run.

Every 999 images, the 'batch time stamp' is incremented by one(1). Thus, three batches may be identified as:

12/10/89 10:00:00
12/10/89 10:00:01
12/10/89 10:00:02

The import process reads each image off the tape, populating the TIF (Temporary Image File) database with header and pixel information, and populating the DIRECTORY database with header and control information. Upon completion of an import run, a complete status report is produced and printed on the systems high-speed printer. This report is referred to as the Import Report. (Generically known as the "Database Population Report.")

This report contains the information regarding batch date and time stamps, as well as listing the entire document id of each specific image, and the status of the insert operation.

The QA process, described in detail below, is driven from this report. By knowing the batch date/time stamp, the operator can request a QA session, by which all or some or none of the

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images may be QA'd. The QA session completes when the operator determines the throughput disposition of the entire batch. The batch may be Accepted, Suspended, or Rejected. Only those images in an "A"ccepted batch whose disposition is "N" or "G" may continue through the system. All other batches and images remain in the TIF.

Every image within a batch may have one and only one QA disposition. The current allowable values are:

N=Not QA'd.
G=QA'd-good(accepted).
S=QA'd-suspended.
B=QA'd-bad(rejected).

Currently, images input to the DSREDS/EDCARS system via magnetic tape are all input with disposition = 'S'. This forces the operator to do 100% QA, or the document(s) remain 'S'uspended and can go no further within the system. (Obviously, there is a great bottleneck potential here if thousands of documents come in. The QA process takes at least 1 minute per image.)

One possible improvement/enhancement would be to treat magnetic tape input the same way that aperture card input is processed, namely, all images enter the system marked as 'N'ot QA'd. This would allow the operator to sample any given batch, say every twentieth image, and accept the batch, which would allow greater system throughput.

Any image marked 'N'ot QA'd is treated the same as any image marked 'G'ood by the DSREDS/EDCARS system; that is, it allows

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images marked as 'N' or 'G' to continue through the system to the Transcription process. (Transcription is the phase where images are written to optical disk.)

1.3.1 Detailed DSREDS/EDCARS Quality Assurance Procedures

This section will explain in detail what steps are to be taken to QA a set of images. Although this section describes the steps to be performed when QA'ing batches of image data input via magnetic tape, it also serves as a generic model that applies to all image data that has entered the DSREDS/EDCARS system.

A. System is up and functioning _____
(Equipment powered-up)
(All units ready)

B. VTAM is up and functioning _____
("S VNET" completed from initial IPL time)

C. CICS is up and functioning _____
("S CICSTIS4" completed)
('CONTROL IS BEING GIVEN TO CICS' message present)

D. GDT/LAN-attached GDT is up and functioning _____
("V 350,ONLINE")
("V 450-451,ONLINE")

E. If using ARLAN, LAN attachment completed _____
("F CICSTIS4,ARAC" entered at MVS console)

F. IMPORT - (Database Population Report) report available to QA operator _____
("ISR26000")

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G. From VTAM banner screen, access CICSTIS4 applid region. (At main DSREDS/EDCARS screen, enter "CICS2" and depress enter key). _____

H. Using your assigned ID and password, logon to CICS (GDT or LAN-attached GDT) _____

I. LOGON successful _____

J. If LOGON unsuccessful, contact your site termination procedures.

K. If DSREDS site, enter transid 'ISR1' _____

L. If EDCARS site, enter transid 'ISR2' _____

M. Main DSREDS/EDCARS screen is displayed _____

N. From main menu, select OPTION '1'-'APERTURE CARD QA' _____

O. Using the Import Report, select a batch to work on. Enter the batch date and time stamp, a start position of '1', a scroll forward increment of '1', and a processing mode of 'N'ormal. _____

P. The first image is downloaded to the GDT screen _____

(If this fails and an error message appears ("GPU80"), the digital data encoding scheme has been corrupted. Immediately contact your site administrator. This is a severe error with the pixel data itself.)

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1.4 Procedure 4 - Visual Validation of Image, Key Identification Data, Contract Specific Requirements

1.4.1 Image Validation

1. Determine that the overall image content is distinct and easily separated from the background. This will require pan, zoom, and scroll operations for images that are larger than the display device can accommodate.

2. All features such as lines, text and symbols must be legible. That is, lines are complete and solid; text including numbers can be read by the operator. Signatures are generally excluded from this requirement.

3. The entire border shall exist and be inspected to determine that the image within the border has not been cropped (cut off with a piece missing).

4. The image shall not be noticeably skewed, i.e., image is aligned parallel to the workstation x or y axis.

5. Lines throughout the image areas shall be distinctly separated.

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1.4.2 Identification Validation

The Database Population Report will be marked up to show, for each image, acceptance or rejection and, if rejected, the specific identification field(s) (document number, revision letter etc.) that failed.

The fields that must be compared between the report and visual display are:

1. Document Number
2. Document Type
3. CAGE (Contractor and Government Entity [FSCM])
4. Revision Letter
5. Sheet Number (may not be displayed at all sites)
6. Image Number (Card number or Frame number)

In addition, there may be other fields specified and dependent on specific contract requirements. For example, there are Accompanying Document Kind, Accompanying Document Number, and Accompanying Document Revision Letter.

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1.4.3 Derive a final opinion of this image:

Is image acceptable? (accept)

-or-

Is image questionable? (suspend)

-or-

Is image un-acceptable? (reject)

1. When decision is made, depress right-hand mouse button
2. With button held down, select 'HOST' option, release (Returns to 'HOST' mode, with 3270 screen presented in foreground.)
3. Enter decision on image disposition: (1=accept, 2=suspend, 3=reject)
4. Next image in batch automatically downloaded.
5. Repeat steps above, QA'ing each image in batch.
6. At batch completion, enter BATCH DISPOSITION, i.e., Accept, Suspend or Reject

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APPENDIX C

CONTRACT CONSIDERATIONS

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CONTRACT CONSIDERATIONS

The contract will be the key document that defines the data delivery requirements. It is recommended that the contract address the following:

- Digital Data MIL-HDBK-59
- Preparation of TDP (MIL-T-31000)
- DID; DI-DRPR-81002
- Digital Data Certification
- Digital Data Warranties
- Penalties for Failure to Perform (By Rejected Image)
- Incentive for Exceptional Performance

The contract should specify the extent of QA to be performed by the contractor (100% QA is recommended). It should specify the acceptance criteria that the government representative will use in the inspection and sampling of data at the contractor's site. The contract should also specify who the government representative will be that will accept the data (i.e., the DSREDS or EDCARS customer, DCAS, AFPRO, ARPRO, etc.).

The contract should specify the data certification requirements. It is recommended that the contractor deliver a certificate with each magnetic tape volume delivered certifying that he/she has prepared and QA'd the data per the contract and associated specifications and procedures.
The contract should also address the contractor's responsibility in delivering and supporting the digital data delivered under the contract.

APPENDIX D

SAMPLE OF FORMS FOR QUALITY ASSURANCE AND DATA ACCEPTANCE

PROCEDURE 1 - SAMPLES

- No forms recommended

PROCEDURE 2 - SAMPLES

- No forms recommended

PROCEDURE 3 - SAMPLES

- Packing Slip (Contractor)
- Data Acceptance Sheet (Contractor)
- Marked Document Identifier Report (Contractor)
- Warning Label

SAMPLE
PACKING SLIP
<CONTRACTOR>

CONTRACT NUMBER _____
CONTRACTOR _____
PACKING LIST NUMBER _____
DATE SHIPPED _____

NUMBER ENCLOSED _____

VOLUME SERIAL 01 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____

FILE NAME _____ DATE CREATED _____

CONTRACTOR POC _____ TEL# _____
CONTRACTOR ADDRESS _____

_____

DESTINATION ADDRESS _____

_____

SHIPMENT _____ OF _____
DATA ACCEPTANCE SHEET PRESENT ____
DOCUMENT IDENTIFIER REPORT PRESENT ____
CONTRACTOR SIGNATURE _____
DATE SIGNED _____
ACCEPT ____ REJECT ____ DATE _____

NOTES _____

_____

D-4

SAMPLE
DATA ACCEPTANCE SHEET
<CONTRACTOR>

CONTRACT # _____
CONTRACTOR _____
DATE SHIPPED _____
NUMBER OF TAPES ENCLOSED _____

VOLUME SERIAL 01 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 02 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 03 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 04 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

VOLUME SERIAL 05 _____ QA PASSED _____

FILE NAME _____ DATE CREATED _____

PACKING SLIP COMPLETED _____ DATE _____

DOCUMENT IDENTIFIER REPORT VALID _____ DATE _____

SHIPMENT _____ OF _____

CONTRACTOR QA 100% _____ DATE SIGNED _____

CONTRACTOR SIGNATURE _____

CONTRACTOR POC _____ TEL# _____

GOVERNMENT REP _____% QA DATE SIGNED _____

GOVERNMENT REP SIGNATURE _____

ACCEPT _____ REJECT _____ DATE _____

NOTES _____

_____

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

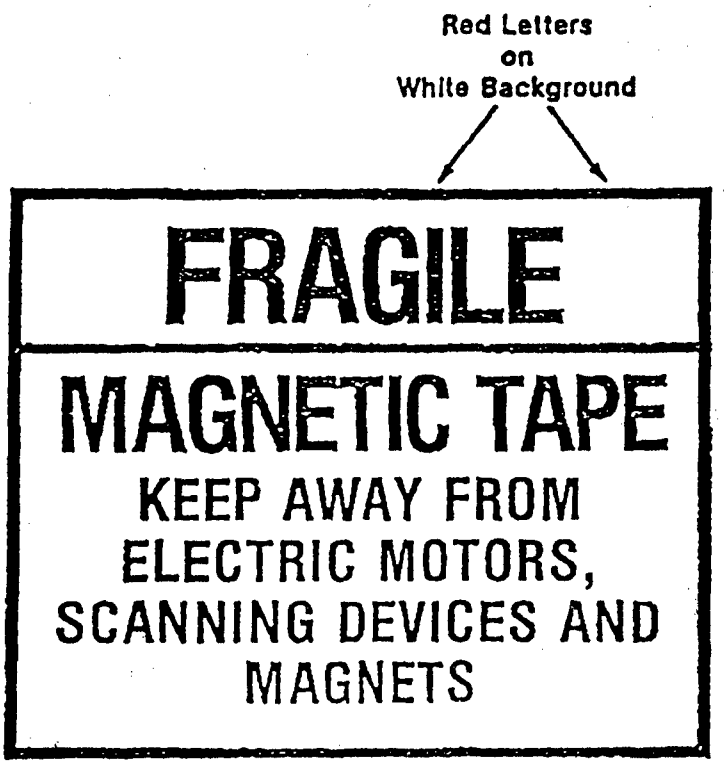
CONTRACT #: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
1234-M-01	PL	54321	AA	0001	002			
1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003


Red Letters
on
White Background
FRAGILE
MAGNETIC TAPE
KEEP AWAY FROM
ELECTRIC MOTORS,
SCANNING DEVICES AND
MAGNETS

PROCEDURE 4 - SAMPLES

- Conversion Report
- Marked Document Identifier Report (Contractor)
- Conversion Acceptance Sheet

SAMPLE
1840A TAPE TO DSREDS/EDCARS
FORMAT CONVERSION REPORT

CONTRACT # : ZYXB07-90-D-A001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS
1234-M-01	PL	54321	AA	0001	002				CONVERTED
1234-S-003	PL	19886	01	0003	004				CONVERTED
333-SM-001	LM	19886	01	0001	001				ERROR

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTRACT NUMBER: ZYXB07-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
1234-M-01	PL	54321	AA	0001	002			
1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

SAMPLE
DSREDS/EDCARS
CONVERSION ACCEPTANCE SHEET

CONTRACT NUMBER _____

PACKING LIST NUMBER _____

DATE PACKAGE RECEIVED _____

TAPE VOLUME SERIAL _____

DATABASE POPULATION ACCEPT _____ REJECT _____

NOTES

_____
_____
_____
_____
_____
_____

SIGNATURE:

GOVERNMENT REPRESENTATIVE _____

DATE SIGNED _____

PROCEDURE 5 - SAMPLES

- Database Population Report
- Marked Document Identifier Report (Contractor)
- Database Populate Acceptance Sheet

SAMPLE
DSREDS/EDCARS
DATABASE POPULATION REPORT

CONTRACT NUMBER: ZYXB07-90-D-A001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS	TIME
1234-M-01	PL	54321	AA	0001	002				STORED	10.01
1234-S-003	PL	19886	01	0003	004				STORED	10.02
9898-333	PL	19886	B	0001	001				DUP-REJ	10.03

TOTAL DOCUMENTS READ : 003

TOTAL BASIC	INSERTED:	002	REJECTED:	001
TOTAL ACCOMP	INSERTED:	000	REJECTED:	000
TOTAL:		002		001

SAMPLE
MARKED DOCUMENT IDENTIFIER REPORT
<CONTRACTOR>

CONTACT NUMBER: ZYX307-90-D-A001

VOLUME SERIAL #: MGB001

BATCH DATE : 01/20/90 BATCH TIME : 10.10.05 PAGE 001

DOCUMENT ID TYPE	DOC LTR	FSCM	REV	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV
1234-M-01	PL	54321	AA	0001	002			
1234-S-003	PL	19886	01	0003	004			
333-SM-001	LM	19886		0001	001	97SDM01	1N	A

TOTAL BASIC DOCUMENTS: 002
TOTAL ACCOMP DOCUMENTS: 001
TOTAL: 003

SAMPLE
DSREDS/EDCARS
DATABASE POPULATE ACCEPTANCE SHEET

CONTRACT NUMBER _____

PACKING LIST NUMBER _____

DATE PACKAGE RECEIVED _____

TAPE VOLUME SERIAL _____

DATABASE POPULATION ACCEPT _____ REJECT _____

NOTES

_____
_____
_____
_____
_____
_____

SIGNATURE:

GOVERNMENT REPRESENTATIVE _____

DATE SIGNED _____

PROCEDURE 6 - SAMPLES

- DSREDS/EDCARS Database Population Report
- Marked DSREDS/EDCARS Database Population Report

SAMPLE
DSREDS/EDCARS
DATABASE POPULATION REPORT

CONTRACT NUMBER: ZYXB07-90-D-A001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS	TIME
1234-M-01	PL	54321	AA	0001	002				STORED	10.01
1234-S-003	PL	19886	01	0003	004				STORED	10.02
9898-333	PL	19886	B	0001	001				DUP-REJ	10.03

TOTAL DOCUMENTS READ : 003

TOTAL BASIC	INSERTED:	002	REJECTED:	001
TOTAL ACCOMP	INSERTED:	000	REJECTED:	000
TOTAL:		002		001

SAMPLE
DSREDS/EDCARS
MARKED DSREDS/EDCARS DATABASE POPULATION REPORT

CONTRACT NUMBER: ZYX307-90-D-A001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS	TIME
1234-M-01	PL	54321	AA	0001	002				STORED	10.01
1234-S-003	PL	19886	01	0003	004				STORED	10.02
9898-333	PL	19886	B	0001	001				DUP-REJ	10.03

TOTAL DOCUMENTS READ : 003

TOTAL BASIC	INSERTED:	002	REJECTED:	001
TOTAL ACCOMP	INSERTED:	000	REJECTED:	000
TOTAL:		002		001

PROCEDURE 7 - SAMPLES

- Final Acceptance Sheet
- DD 250 Form
- Acceptance/Rejection Letter
  (NOTE: NOT shown since differs from each agency)
- Marked DSREDS/EDCARS Database Population Report

FINAL ACCEPTANCE SHEET
DSREDS/EDCARS

CONTRACT NUMBER _____

ORIGINAL PACKING LIST # _____

DATE PACKAGE RECEIVED _____

TAPE VOLUME 01 _____

TAPE VOLUME 02 _____

TAPE VOLUME 03 _____

TAPE VOLUME 04 _____

TAPE VOLUME 05 _____

CONTRACTOR:

NAME _____
CAGE _____
ADDRESS _____
CONTACT _____
TEL. NO. _____

ACCEPTABLE/REJECT:

	ACCEPTABLE	REJECT
MAGNETIC TAPE PKG/MARK	_____	_____
CONVERSION SATISFACTORY	_____	_____
DATABASE POPULATION	_____	_____
VISUAL IMAGE VALIDATION	_____	_____
VISUAL ID VALIDATION	_____	_____

COMMENTS:

_____
_____
_____
_____
_____

FINAL PACKAGE DISPOSITION: ACCEPTABLE _____ REJECT _____

SIGNATURES:
GOVERNMENT REPRESENTATIVE _____
DATE _____

Form approved OMB No. 0704-0:

MATERIAL INSPECTION AND RECEIVING REPORT

1. PROC INSTRUMENT IDEN (CONTRACT)	(ORDER NO)	6. INVOICE	7. PAGE	OF
			8. ACCEPTANCE POI	

2. SHIPMENT NO.	3. DATE SHIPPED	4. B/L TCN	5. DISCOUNT TERMS

9. PRIME CONTRACTOR CODE		10. ADMINISTERED BY CODE	

11. SHIPPED FROM (if other than 9) CODE	FOB:	12. PAYMENT WILL BE MADE BY CODE	

13. SHIPPED TO CODE		14. MARKED FOR CODE	

16. ITEM NO.	16. STOCK/PART NO. DESCRIPTION (Indicate number of shipping containers - type of container - container number)	17. QUANTITY SHIP/REC'D *	18. UNIT	19. UNIT PRICE	20. AMOUNT

21. PROCUREMENT QUALITY ASSURANCE		22. RECEIVER'S USE
A. ORIGIN ☐ POA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.	B. DESTINATION ☐ POA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.	Quantities shown in column 17 were received in apparent good condition except as noted.
DATE / SIGNATURE OF AUTH GOVT REP	DATE / SIGNATURE OF AUTH GOVT REP	DATE RECEIVED / SIGNATURE OF AUTH GOVT REP
TYPED NAME AND OFFICE	TYPED NAME AND TITLE	TYPED NAME AND OFFICE
23. CONTRACTOR USE ONLY		* If quantity received by the Government is the same as quantity shipped, indicate by (✓) mark. If different, enter actual quantity received below quantity shipped and encircle.

DD FORM NOV 88 250 REPLACES EDITION OF 1 AUG 67 WHICH MAY BE USED

SAMPLE
DSREDS/EDCARS
MARKED DSREDS/EDCARS DATABASE POPULATION REPORT

CONTRACT NUMBER: ZYXB07-90-D-A001

DOCUMENT ID	DOC TYPE	FSCM	REV LTR	CRD#	SHT#	ACC DOC	ACC KIND	ACC REV	STATUS	TIME
1234-M-01	PL	54321	AA	0001	002				STORED	10.01
1234-S-003	PL	19886	01	0003	004				STORED	10.02
9898-333	PL	19886	B	0001	001				DUP-REJ	10.03

TOTAL DOCUMENTS READ : 003

TOTAL BASIC	INSERTED:	002	REJECTED:	001
TOTAL ACCOMP	INSERTED:	000	REJECTED:	000
		---		---
TOTAL:		002		001